Bulletin
No. 263

# Clippard Minimatic

# MINIATURE FLUID POWER DEVICES

*Industry's Only **COMPLETE** Miniature Fluid Power Line!*

**"PRECISIONEERED". . . . . for Millions of Cycles of Trouble-Free Operation**

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**VALVES**
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N. B. COCHRANE CO.
2828 LOCH RAVEN RD. BALTO. 18, MD.
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Clippard Minimatic
Miniature Fluid Power Devices

CLIPPARD INSTRUMENT LABORATORY, INC.
7390 COLERAIN ROAD • CINCINNATI 39, OHIO
TELEPHONE: 521-4261 • AREA CODE: 513

Dear Friends:

Thank you for your interest in the Clippard Line of Miniature Fluid Power Products. Over eighteen years ago we developed the first miniature devices for use in mass precision production of electronic parts in our own plants, which today are still our first line proving grounds.

We work hard to win friends and harder to help our friends reap a harvest of profit through the use of our fluid power products.

As you examine the "miniatures" shown on the following pages, you will surely think of many ways in which these devices are ideal for use in your designs for control circuitry, jigs, fixtures, feeding devices, automatic and semi-automatic machines, just to mention a few. Our building block concept and wide selection of devices will give you a great deal of flexibility and help you put your ideas into practice.

We have tried to make this catalogue interesting, concise and factual. If you would like more detailed information essential to your application, please feel free to contact us.

We are looking forward to the opportunity of serving you.

Cordially,

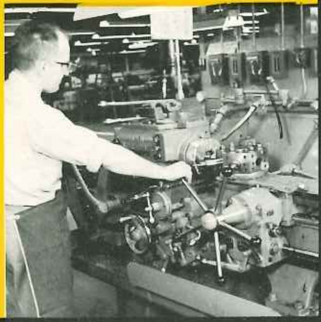
CLIPPARD INSTRUMENT LABORATORY, INC.

Wm L. Clippard Jr.

W. L. Clippard, Jr., President

search

esign



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Plant
Exterior

Production

Assembly

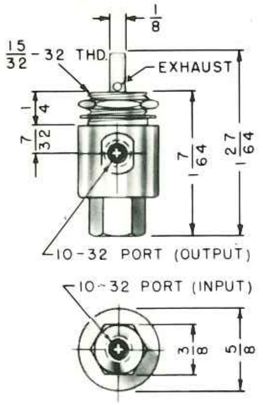
Stockroom

Shipping

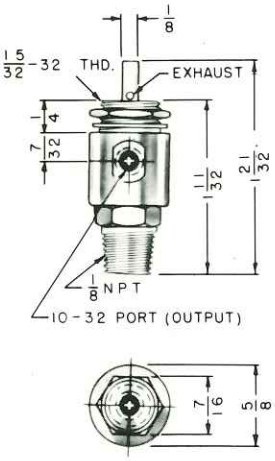
# *Clippard* MINIATURE CONTROL VALVES

Here are the miniature "Air Switches" of the fluid power field, useful in automated and semi-automatic work operations where savings in cost, space and weight are important. All are precision machined from brass. Stems and springs are stainless steel to prevent corrosion and give long life. All seals are Buna N. All valves are made for panel or bracket mounting. Nuts and washers are provided where shown. All units are bright dipped for appearance and corrosion resistance.

**Dimensions MAV-2 and MAV-3**



**Dimensions MAV-2P and MAV-3P**



NOTE: Stem travel of both of these valves is ⅛ inch, with 1/64 inch overtravel. DO NOT use stem itself as a stop.

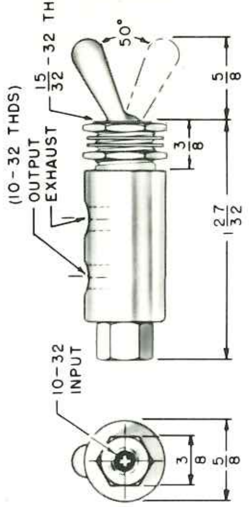
## 2-WAY VALVES
## Model No. MAV-2 and MAV-2P

Direct acting, normally closed 2-way poppet valve for use with air, oil, or water.

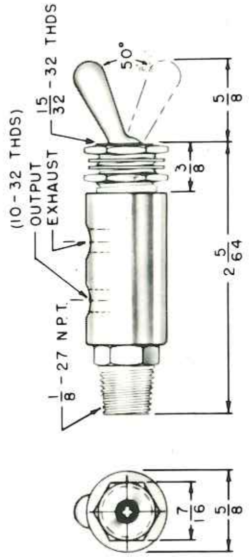
## 3-WAY VALVES
## Model No. MAV-3 and 3P

Direct acting, normally closed 3-way poppet valves for operating spring return cylinders or pilot valves for use with air only. Exhaust is to atmosphere through hollow stem.

**Dimensions MTV-3**



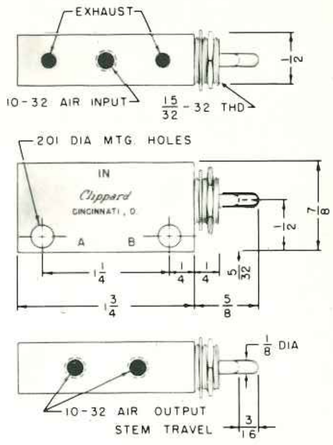
**Dimensions MTV-3P**



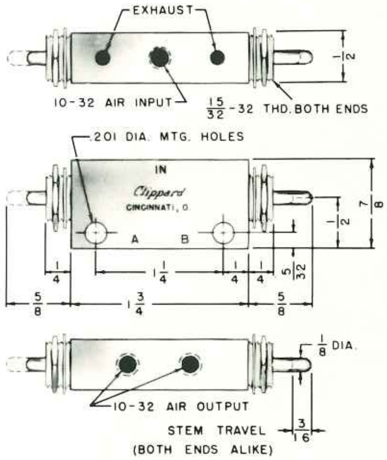
## 3-WAY TOGGLE VALVES
## Model No. MTV-3 and MTV-3P

"Bat handle" 3-way poppet type toggle valve. Captive tapped exhaust permits its use as a "hold down" or "Off-On" switch for air or oil. Exhaust may be plugged with #11755 screw plug to allow its use as a 2-way valve.

**Dimensions MAV-4**



**Dimensions MAV-4D**



## 4-WAY VALVES
## Model No. MAV-4 and MAV-4D

Direct acting, 4-way spool valves for operating double acting cylinders or larger pilot valves. May be used as normally open or normally closed 3-way valves by plugging one port with #11755 screw plug. Ballized bore and nylatron bushings provide smooth action and long life. For use with air only — exhaust is to atmosphere. On MAV-4 offset spring returns plunger. MAV-4D is not spring loaded.

| DESIGN AND PERFORMANCE DATA | MODEL NUMBER | | | |
|---|---|---|---|---|
| | MAV-2 & 2P | MAV-3 & 3P | MAV-4 & 4D | MTV-3 & 3P |
| Type of Valve | 2-Way | 3-Way | 4-Way | 3-Way (Toggle) |
| Medium | Air or Hyd. | Air Only | Air Only | Air or Hyd. |
| Recommended Working Range (PSI) | 0-300 | 0-300 | 5-150 | 0-300 |
| Flow @ 50 psi Air (CFM) | 4.0 | 4.0 | 5.0 | 4.0 |
| Flow @ 100 psi Air (CFM) | 6.8 | 6.8 | 8.7 | 7.3 |
| Force Required for Full Stem Travel @ 50 psi (OZ.) | 24 | 24 | MAV-4 = 38<br>MAV-4D = 12 | 16 |
| Temperature Range | — 30° F to + 230° F | | | |

# *Clippard* MINIATURE VALVE ACTUATORS

## A.C. VALVE SOLENOIDS—Model No. AVSC (50-60 Cycle A.C.)

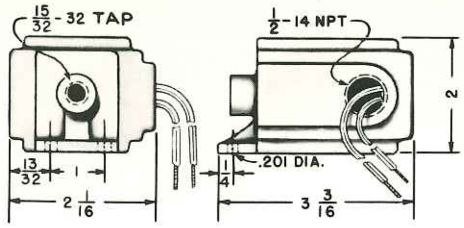
Threads onto the top of Clippard miniature two way, three way, and four way control valves, converting them into direct acting solenoid valves. Unlike many in the field, these solenoids are made for Class A continuous duty cycle and long life. As fast as any on the market, these solenoids will operate valves at speeds of approximately 5-9 milliseconds in any position. Housing is rugged cast aluminum. Coil is molded for protection from moisture. Provided with two 12-inch leads of stranded vinyl insulated wire. One lock washer (furnished with Clippard valves) should be used for proper spacing when mounting valves.

## D.C. VALVE SOLENOIDS — Model No. AVS

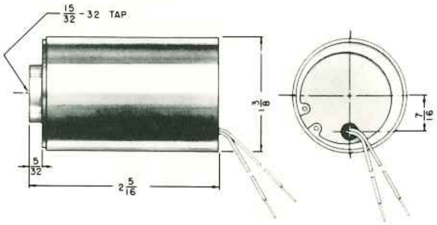
Threads onto the top of Clippard miniature two way and three way control valves, converting them to direct acting solenoid valves. (Use A.C. model above for 4 way valve). Unlike many in the field, these solenoids are made for Class A continuous duty cycle and long life. Will operate valves in any position at speeds of approximately 20-30 milliseconds. Provided with two 12-inch leads of stranded vinyl insulated wire.

## PILOT ACTUATOR — Model No. MPA-3

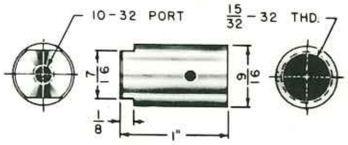
One of the most versatile items in the Clippard line. Permits wide circuit flexibility and allows many control functions to be accomplished pneumatically with less cost, hazards and complexity. Screws onto the tops of our Miniature 2-way, 3-way, and 4-way valves and ES-1 electric switch to provide fast pilot actuation from a fluid power signal. Among other things a MPA-3 actuator can: ● Remotely actuate any number of valves and switches simultaneously in different strategic locations from a single miniature 3-way valve. ● Act as an air (or hydraulic) relay, i.e., one pressure source to another. ● Operate the MAV-4D from a single impulse. ● Make an ES-1 into a pressure switch. ● Serve as a pressure interlock or safety device, i.e., turn off power when pressure fails, etc. ● Provide an electric take off from a fluid power circuit to start and stop power, actuate electric counters, indicator lights on panel boards, etc. Machined from brass, the MPA-3 has a stainless steel spring and Buna N quad ring seal. Displacement is ½ cc. Recommended working range 25-250 psi. Temperature range — 65° to 250° F.



| MODEL NO. | VOLTS (A.C.) | CURRENT (AMPS) | |
|---|---|---|---|
| | | IN RUSH | HOLD |
| AVSC-12 | 12 | 7.25 | 1.88 |
| AVSC-24 | 24 | 3.85 | 1.16 |
| AVSC-115 | 115 | 0.75 | 0.24 |
| AVSC-230 | 230 | 0.40 | 0.13 |



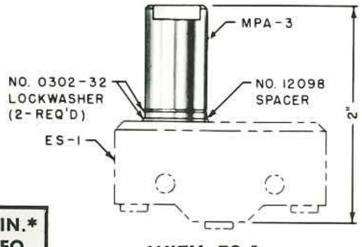
| MODEL NO. | VOLTS (D.C.) | CURRENT (AMPS) |
|---|---|---|
| AVS-12 | 12 | 0.64 |
| AVS-24 | 24 | 0.32 |
| AVS-48 | 48 | 0.16 |



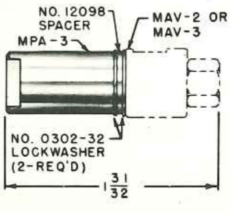
**MIN. OPERATING PRESSURES FOR PILOT-ACTUATOR COMBINATIONS**

| MPA-3 WITH: | MIN.* REQ. |
|---|---|
| ES-1 Switch | 12 psi |
| MAV-2 & MAV-3 Valves | 23 psi |
| MAV-4 Valve | 36 psi |
| MAV-4D Valve | 16 psi |

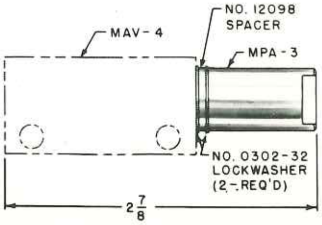
*Operation is possible at slightly lower pressures with spring removed, but this is normally not reccommended.



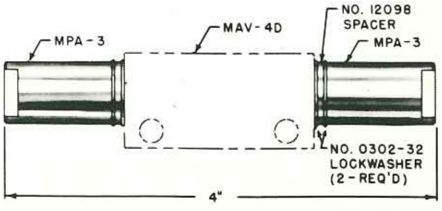
**WITH ES-1**



**WITH MAV-2 OR 3**



**WITH MAV-4**



**WITH MAV-4D**

# *Clippard* VALVE ACTUATOR ACCESSORIES

## PILOT COUPLER — No. 15014

This accessory is for use with the Clippard 3SS ½″ cylinder. It will provide for pilot operations of any control valves on page three, the ES-1 Electrical Switch, and many other plunger type electrical switches. Cylinder screws into one end, valve or switch screws into the other. May serve as pilot operator, air relay for one pressure source to operate another, a pressure switch, or a safety device. When connected to the air supply on a machine, it may be used to disconnect power when pressure fails, or as a take-off for an electrical counter.

Coupler is machined from brass bar stock and furnished with a mounting nut and lock washer. It can be stud mounted or bracket mounted with our No. 11917-1 or No. 11918-1 brackets.

## CAM FOLLOWER HEAD — Part No. 11925

This accessory may be used for operating the miniature control valves and switch shown in the table below. It is required for activating these units when used on the Clippard Sequence Programer. A mounting nut (supplied with the valves), mounting bracket, or 1/16″ washer should be placed between the cam follower and valve to allow proper spacing for full stem travel.

## VALVE MOUNTING BRACKET (FLAT)
### Part No. 11917-1

Made of sturdy cadmium plated steel. A convenient mounting for all control valves on page three and No. 15014 Pilot Coupler.

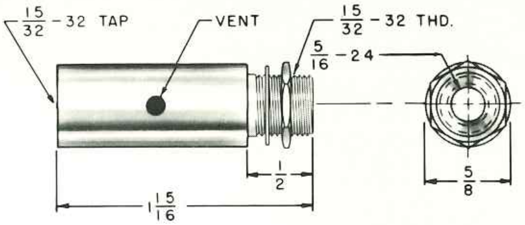
## VALVE MOUNTING BRACKET (ANGLED)
### Part No. 11918-1

Same as above, except formed at right angle.

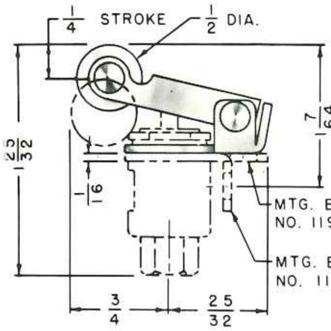
## MANUAL PUSH BUTTON — Part No. 11916

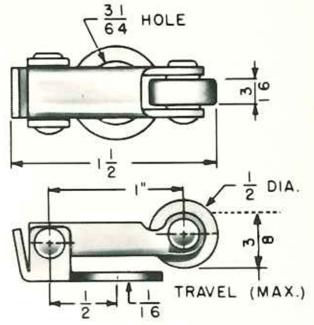
For manual operation of all Clippard Miniature Control Valves shown in the table below. Machined from solid brass. Supplied with Allen Head locking screw and wrench.

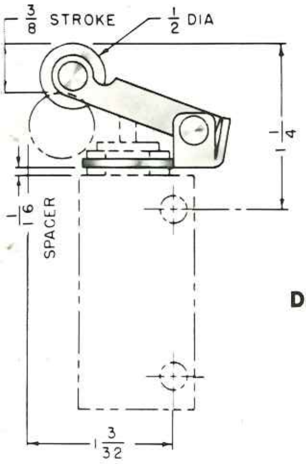
**Dimensions — No. 15014**



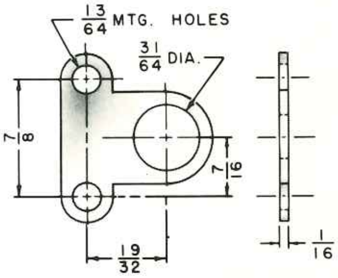
**Dimensions — No. 11925**



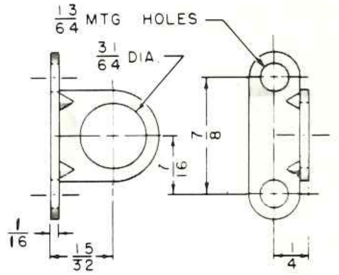


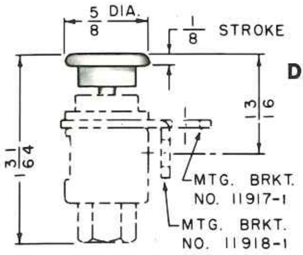


**Dimensions — No. 11917-1**

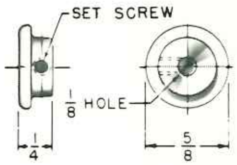


**Dimensions — No. 11918-1**





**Dimensions — No. 11916-1**



**METHODS OF ACTUATING CLIPPARD VALVES & SWITCH**

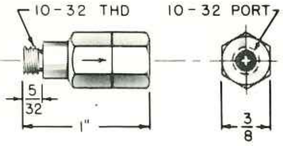
| ITEM TO BE ACTUATED | MANUAL PUSH BUTTON #11916 | CAM FOLLOWER #11925 | PILOT ACTUATION WITH #MPA-3 | | SOLENOID ACTUATION WITH #AVS & AVSC | | SEQUENCE PROGRAMER #MSP |
|---|---|---|---|---|---|---|---|
| | | | SINGLE | DOUBLE | SINGLE | DOUBLE | |
| 2-Way MAV-2 & 2P | √ | √ | √ | — | √ | — | See Page 17 |
| 3-Way MAV-3 & 3P | √ | √ | √ | "A" | √ | "A"(A.C. only) | See Page 17 |
| 4-Way MAV-4 | √ | √ | √ | — | (A.C. only) | — | See Page 17 |
| 4-WAY MAV-4D | √ | √ | √ | √ | (A.C. only) | (A.C. only) | See Page 17 |
| Electric Switch ES-1 | — | √ | √ | — | (A.C. only) | — | See Page 17 |

"A" = use MAV-4D with one port plugged for 3-Way Valve.

# *Clippard* MINIATURE FLOW VALVES

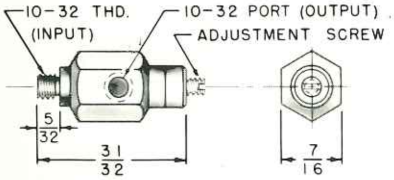
Made from sturdy brass and stainless steel with Buna N seals, these units all have 10-32 ports and may be interconnected with Clippard Control Valves, Cylinders and fittings.

## CHECK VALVE — Model No. MCV-1



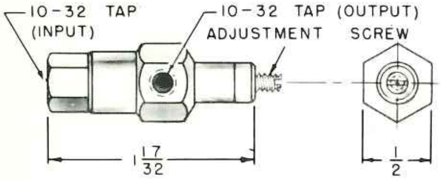
Poppet type. Permits flow in one direction only.

## NEEDLE VALVE — Model No. MNV-1



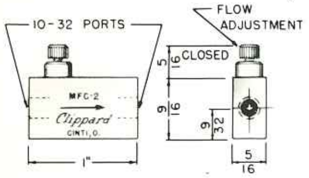
Restricts flow in both directions. Ideal for controlling speeds of Clippard Miniature Cylinders. Flow adjustment is made with screwdriver.

## FLOW CONTROL VALVE — Model No. MFC-1



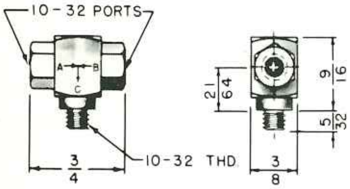
Ideal for controlling speeds of Clippard Miniature Cylinders. Controls flow in one direction only with full flow return. Flow adjustment is made with screwdriver.

## FLOW CONTROL VALVE — Model No. MFC-2



For more precision flow controlling and precise speed control of Clippard Miniature Cylinders. Check Valve—Needle Valve combination. Flow adjustment is made with knurled knob.

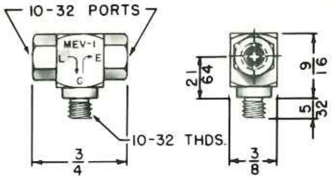
## SHUTTLE VALVE (Double Check Valve) — Model No. MSV-1



Flow from "A" to "C" or "B" to "C". "A" and "B" can never flow to each other. Exhaust is thru port where pressure was last applied, i.e., if pressure is applied thru "A", exhaust is "C" to "A". This shuttle valve allows one cylinder to be controlled by two valves. For each additional control valve you require an additional shuttle valve for your circuit. Will screw directly into Clippard Miniature Cylinder or another Clippard Shuttle Valve. Some typical circuits shown on page 19.

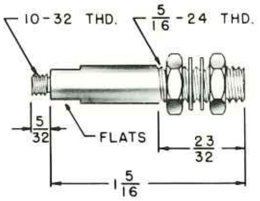
## QUICK EXHAUST VALVE — Model No. MEV-1

Connect this unit in long line near cylinder for fast cylinder return. Slight reduction in line pressure opens valve to exhaust automatically. Exhaust rate is 5.0 CFM at 50 psi; 9.0 CFM at 100 psi.

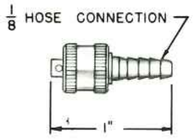


## MINIATURE QUICK CONNECT ASSEMBLIES

### Model No. MQC-2 ASSEMBLY

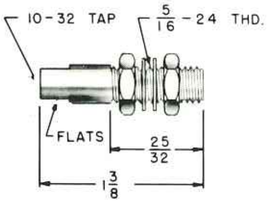


MQC-V2

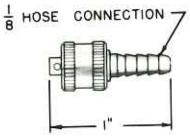


MQC-F

### Model No. MQC-3 ASSEMBLY



MQC-V3



MQC-F

Clippard Miniature Panel Mounting Quick Couplings are ideal for experimental or permanent instrumentation, patch systems and quick set ups of machines, jigs and fixtures using air, oil, or water. Simply plug in, twist to right and you are assured of a positive, leakproof, high pressure connection that will not pull out thru accident or vibration. Body contains integral check valve that stops the flow when uncoupled. May be mounted in panel up to ¼″ thick with two 7/16″ mounting nuts and lockwashers furnished. Valve units or hose connectors may be ordered separately if desired. When ordering separate parts, specify:

MQC-F for hose connection
MQC-V2 for valve unit of MQC-2
MQC-V3 for valve unit of MQC-3

### MINIATURE FLOW VALVE DESIGN AND PERFORMANCE DATA

| MODEL NUMBER | MNV-1 | MFC-1 | MFC-2 | MCV-1 | MSV-1 | MEV-1 | MQC-2 & 3 |
|---|---|---|---|---|---|---|---|
| Type | Needle | Flow | Flow | Check | Shuttle (Double Check) | Quick Exhaust | Quick Couplings |
| Medium | Air or Hyd. | Air or Hyd. | Air or Hyd. | Air or Hyd. | Air or Hyd. | Air Only | Air Only |
| Rec. Working Range (PSI) | 0-2000 | 0-250 | 0-300 | 0-1000<br>(opens approx. 2 psi) | .5 to 250 | 5-150 | 0-300 |
| Flow @ 50 psi Air (CFM) | 0-3.8 | .02-3.7 | 0-4.0 | 4.2 | 5.0 | 4.8 | 3.0 |
| Flow @ 100 psi Air (CFM) | 0-6.0 | .05-6.9 | 0-7.0 | 7.8 | 9.5 | 8.8 | 5.8 |
| Temp. Range | — 30° F to + 230° F | | | | | | |

# *Clippard* MINIATURE AIR REGULATORS

This advanced type, self-relieving, Air Pressure Regulator was specifically designed for use with Clippard Valves, Cylinders and Accessories. It is also ideal, within its air flow rating, for control of all types of pneumatic equipment. Mounts neatly on panel or Clippard No. 11917-1 and 11918-1 Brackets. All materials used are finest quality brass, stainless steel and Buna N, for long, trouble-free service.

## DESIGN FEATURES

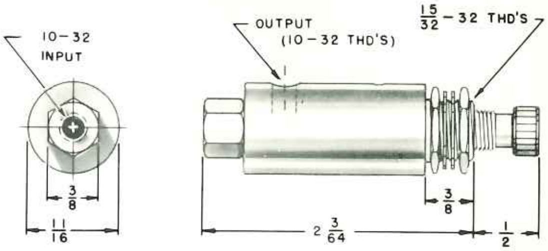
1. Self-relieving type. Permits pressure to be adjusted downward as well as up. Eliminates creepage of down-stream pressure. Holds pressure constant.
2. Knurled micro-adjustment knob, with 40 pitch threads on adjustment screw, permits smooth, easy pressure selection without use of tools.
3. Delivery pressure range of 0 - 100 psi.
4. Small, compact — ideal for mounting on individual jigs and fixtures as well as in control circuits.
5. Panel mounting permits unit to be located with other controls on a control console or panel board for pilot operation of larger regulators or for remote control. Mounting nuts and lockwashers furnished.
6. Convenient to use with wide range of Clippard fittings, valves and cylinders. MAR-1P has standard ⅛″ NPT inlet. MAR-1 has 10-32. Both have 10-32 outlets.
7. Screw together construction. All parts replaceable.
8. NON-RELIEVING TYPE REGULATORS ARE AVAILABLE AT NO ADDITIONAL CHARGE UPON REQUEST. SPECIFY NON-RELIEVING IF DESIRED.

## PERFORMANCE

- **Maximum Inlet Pressure: 250 psi**
- **Regulating Range: 0 to 100 psi**
- **Flow at 50 psi Inlet Pressure: 4.5 CFM**
- **Flow at 100 psi Inlet Pressure 8.2 CFM**
- **Temperature Range: —30° to +250° F**

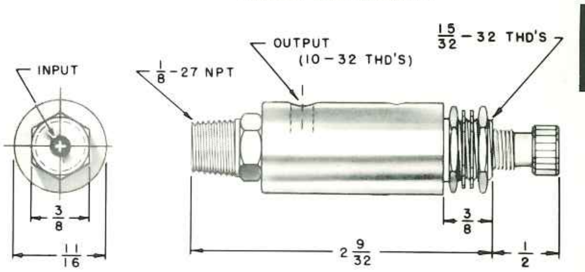
**Dimensions**

**Model No. MAR-1**



**Dimensions**

**Model No. MAR-1P**



# *Clippard* MINIATURE DUAL AIR FILTER

Clean air is necessary for the successful operation of any pneumatic system, but an absolute MUST where Miniature Cylinders and Valves are used, because of closer tolerances and faster cycling. Here is a simple, easily serviced, easily drained filter of unusual efficiency, designed expressly for use with Clippard Miniature Regulators, Valves, Cylinders and Accessories. You will also find it useful as a basic filter for many ⅛″ air line systems. Materials and workmanship are of finest quality for long, durable and efficient service.

## DESIGN FEATURES

1. Two concentric 25 micron elements filter out solid particles and loose moisture.
2. "Vyon" filter material is chemically inert. No loose or fragile fibers.
3. Easily drained by depressing valve stem button on bottom.
4. Filter cannister and elements may be unscrewed from unit at point "A" (see illustration) for cleaning or servicing without disturbing plumbing connections or mounting.
5. Inlet is both threaded for standard ⅛ NPT and tapped 10-32 for Clippard fittings. Output tapped ⅛-27 NPT.
6. Fits on bottom of MAR-1P to make a compact, vertically in-line filter-regulator combination with overall diameter of only 11/16″.

## MATERIALS

Brass and stainless steel. Buna N seals. 25 micron filter elements of imported "Vyon", an inert polyethylene, has low pressure drop characteristics.

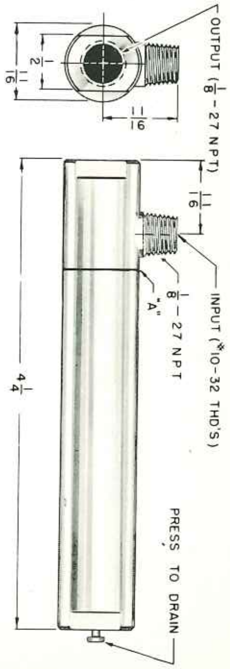
## PERFORMANCE

- **Pressure Range: 0 to 250 psi Air Only**
- **Flow at 50 psi: 5.2 CFM**
- **Flow at 100 psi: 9.2 CFM**
- **Temperature Range: —90° to +180° F**

## MAINTENANCE NOTES:

To obtain maximum effectiveness and performance, mount vertically with clean-out valve at bottom. Drain filter regularly by depressing clean-out valve stem to discharge accumulated water, etc. For complete cleaning, unscrew body at point "A" (see drawing, right). Remove filter by unscrewing from head piece. Filter may be rinsed in gasoline or kerosene and blown out thru stem with compressed air. Reassemble, and filter is ready for operation. CAUTION: Be sure ALL air pressure is released from filter before unscrewing body. Replacement Filter Element No. 12145 available.

**Dimensions**
**Model**
**No. MAF-1**



# ENGINEERING AND DESIGN DATA– Clippard MINIMATIC CYLINDERS

| CYLINDERS | ENGINEERING DATA | | | DESIGN FEATURES | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | MEDIUM | FORCE FACTOR | RECOMMENDED MAXIMUM WORKING PRESSURE | PISTON SEALS | ROD SEALS | ROD DIAMETER | ROD END | CONSTRUCTION | |
| Page 9<br>6.35 mm ( 1/4" Bore) Spring Return | Air | .05 | 125 psi | Quad Ring | — | 1/8" | Threaded | Rolled | — |
| Page 9<br>3/8" Bore Spring Returns | Air | .1 | 125 psi | Vee Block | — | 3/16" | *Non-Threaded | RF Silver Soldered | *Model 3 PS 1/2 is rolled construction with non-rotating, threaded brass rod. Others; non-threaded stainless steel. |
| Page 9<br>3/8" Bore Double Acting | Air and Hydraulic | .1 | 125 psi Air and 500 psi Hydraulic | Vee Blocks | Vee Ring | 1/8" | Non-Threaded | RF Silver Soldered | — |
| Page 10<br>9/16" Bore Spring Returns | Air | .22 | 125 psi Air | Vee Block | — | 3/16" | †Non-Threaded | RF Silver Soldered | †9PS-3/4 and 9SS-3/4 models have non-rotating threaded silicon-bronze rods. Others; non-threaded stainless steel. |
| Page 10<br>9/16" Bore Double Acting | Air and Hydraulic | .22 | 125 psi Air and 500 psi Hydraulic | Vee Blocks | Vee Ring | 3/16" | Non-Threaded | RF Silver Soldered | — |
| Page 11<br>Heavy Duty<br>9/16" Bore Spring Returns | Air | .20 | 250 psi | Vee Block | — | 1/4" | Threaded | Threaded | — |
| Page 11<br>Heavy Duty<br>9/16" Bore Double Acting | Air and Hydraulic | .20 | 250 psi Air and 2000 psi Hydraulic | T Ring | Vee Ring | 1/4" | Threaded | Threaded | — |
| Page 12<br>7/8" Bore Spring Return | Air | .60 | 250 psi | Vee Block | — | 1/4" | Threaded | Threaded | Sintered Bronze Rod Bushing |
| Page 12<br>7/8" Bore Double Acting | Air and Hydraulic | .60 | 250 psi Air and 2000 psi Hydraulic | T Ring | Vee Ring | 1/4" | Threaded | Threaded | Sintered Bronze Rod Bushing |

TEMPERATURE RANGE: —30° F to +230° F

# GENERAL SPECIFICATIONS Clippard MINIMATIC CYLINDERS

**CYLINDER TUBES:**

Machined from heavy wall, hard-drawn brass tubing. Ballized internally for precise size, fine finish and low seal friction.

**PISTON RODS:**

Except where otherwise specified, all rods are stainless steel, ground, polished and roller burnished for long seal life, low friction and smooth action.

**PISTONS:**

Brass in all models except aluminum in 7/8" bore single acting series.

**SPRINGS:**

Stainless steel for resistance to corrosion and long life.

**QUICK CYLINDER COMPUTATIONS:**

**Ram Force = Force Factor × Pressure**

**Displacement = Force Factor × Stroke**

**(Force factor given in table above equals effective piston area)**

**SEALS:**

Buna N compound, impervious to a wide range of hydraulic fluids, liquids, and gasses. Rod seals replaceable on all models. Piston seals replaceable only on threaded construction models.

**CUSHIONS:**

Resilient cushions of Buna N compound on all models to absorb shock, increase life, reduce noise level by 80%.

**PORTS:**

Tapped 10-32 in all 1/4", 3/8" 9/16" bore sizes for wide selection of Clippard fittings and valves. 7/8" bore cylinders tapped for 1/8 NPT. (1/8 NPT to 10-32 Adaptors available.)

**FINISH:**

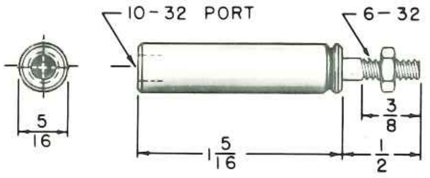
All external brass parts are "bright-dipped" to resist corrosion and preserve finished appearance.

# *Clippard* MINIMATIC CYLINDERS

Below, and on the pages that follow, are Clippard Minimatic Cylinders displayed in an amazing variety of useful sizes, types and mounting styles. Each, from the smallest ¼″ bore SM-6 to the largest heavy-duty type, is of finest OEM quality, designed, manufactured and life tested for outstanding performance and long-lasting "on-the-job" service. When you choose Clippard cylinders you are the beneficiary of the extra engineering knowledge that accumulates only from years of intelligent experience. Clippard cylinders are not hastily conceived imitations of other products, but original designs, pioneered, proved and constantly improved by THE PIONEER of the Miniature Fluid Power Field. We trust you will find Clippard Minimatic Cylinders and their related components the rewarding answer to your problems in the design of new automated controls and equipment, or in endless automatic and semi-automatic time and work saving functions.

## 6.35MM (1/4″) BORE SUB-MINIATURE CYLINDER

### TYPE SM-6, PLAIN END, SPRING RETURN

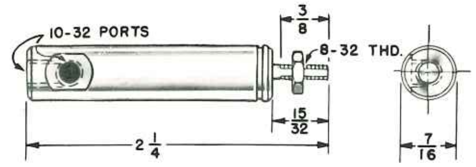


Available in ⅜″ stroke only

RECOMMENDED FOR AIR ONLY

## 3/8 INCH BORE MINIATURE CYLINDERS

### TYPE 3PS½ PLAIN END, SPRING RETURN

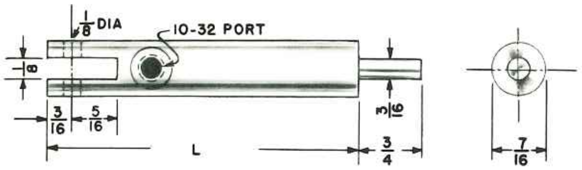


Non-rotating Shaft (Brass) Keyed with flats.

Available in ½″ stroke only

RECOMMENDED FOR AIR ONLY

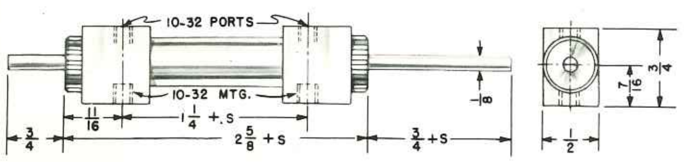
### TYPE 3CS CLEVIS MOUNT, SPRING RETURN



| Stroke (Inches) | ½ | 1 | 2 | 3 |
|---|---|---|---|---|
| "L" (Inches) | 2 ½ | 3⁷⁄₁₆ | 5⁵⁄₁₆ | 7³⁄₁₆ |

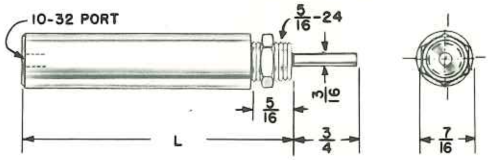
RECOMMENDED FOR AIR ONLY

### TYPE 3BDD BLOCK MOUNT, DOUBLE ACTING DOUBLE RAM



(S) Strokes: 1, 2, 3 or 4 inch.

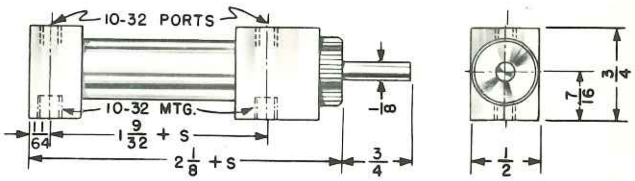
### TYPE 3SS STUD MOUNT, SPRING RETURN



| Stroke (Inches) | ½ | 1 | 2 | 3 |
|---|---|---|---|---|
| "L" (Inches) | 2³⁄₃₂ | 3¹¹⁄₃₂ | 5⁷⁄₃₂ | 7³⁄₃₂ |

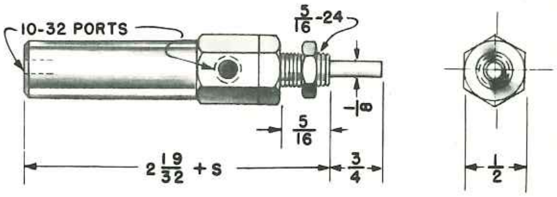
RECOMMENDED FOR AIR ONLY

### TYPE 3BDS BLOCK MOUNT, DOUBLE ACTING, SINGLE RAM



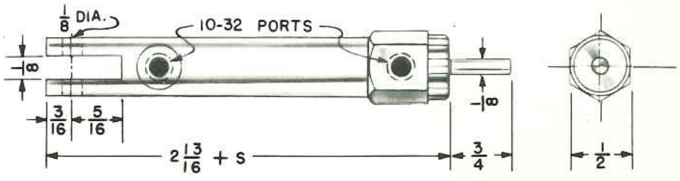
(S) Strokes: 1, 2, 3, 4, 5 or 6 inch.

### TYPE 3SD STUD MOUNT, DOUBLE ACTING



(S) Strokes: 1, 2, 3 or 4 inch.

### TYPE 3CD CLEVIS MOUNT, DOUBLE ACTING

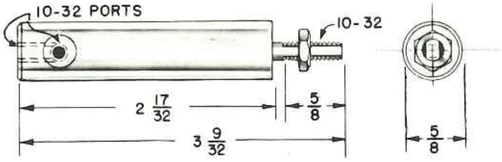


(S) Strokes: 1, 2, 3 or 4 inch.

# 9/16 INCH BORE MINIATURE CYLINDERS

Similar in construction and general specifications to Clippard ⅜ inch bore miniature cylinders shown on page 9, the Clippard 9⁄16 inch bore cylinders shown on this page are designed for heavier work loads and develop greater thrusts, because of their larger diameter bore. All, regardless of action or mounting style, are radio frequency silver soldered, resulting in strong one-piece construction and positive seal. Piston seals on all cylinders are self-adjusting "V" rings, which take up their own wear and provide extremely long life. Buna N bumpers absorb noise and shock and add maximum life to assemblies. These cylinders are ideal for applications requiring greater thrust than ⅜ inch bore cylinders, but where more expensive de luxe heavy duty features are not necessary. See page 8 for complete specifications and design data.

## TYPE 9PS¾ PLAIN END, SPRING RETURN

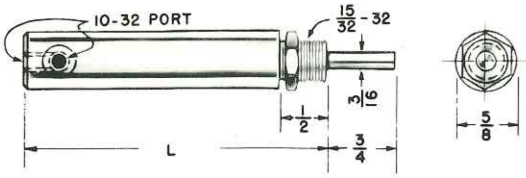


Non-rotating Shaft Keyed with Flats

Available in ¾ inch Stroke Only

RECOMMENDED FOR AIR ONLY

## TYPE 9SS STUD MOUNT, SPRING RETURN

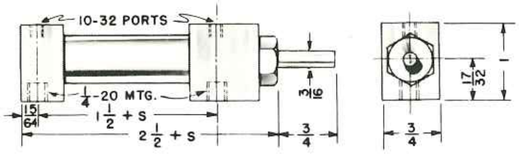


NOTE: On ¾" stroke only, rod is keyed with flats, (non-rotating) and threaded 10-32 x ⅝.

| Stroke (Inches) | ¾ | 1½ | 2¼ | 3 |
|---|---|---|---|---|
| "L" (Inches) | 3 1⁄32 | 4 17⁄32 | 5 ⅞ | 7 ¼ |

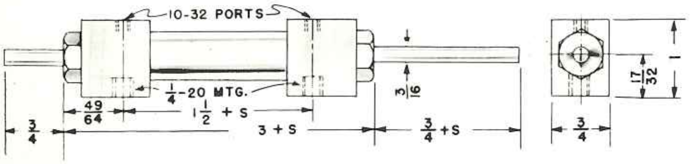
RECOMMENDED FOR AIR ONLY

## TYPE 9BDS BLOCK MOUNT, DOUBLE ACTING, SINGLE RAM



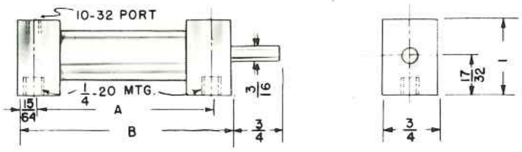
(S) Strokes: 1, 2, 3, 4, 5 or 6 inch.

## TYPE 9BDD BLOCK MOUNT, DOUBLE ACTING, DOUBLE RAM



(S) Strokes: 1, 2, 3, 4, 5 or 6 inch.

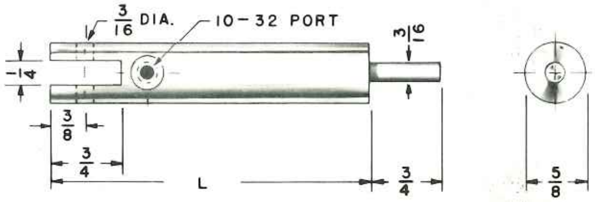
## TYPE 9BS BLOCK MOUNT, SPRING RETURN



| Stroke (Inches) | ¾ | 1½ | 2¼ | 3 |
|---|---|---|---|---|
| "A" (Inches) | 2 5⁄16 | 3 ¾ | 5 ⅛ | 6 ½ |
| "B" (Inches) | 2 ¾ | 4 7⁄32 | 5 19⁄32 | 6 15⁄16 |

RECOMMENDED FOR AIR ONLY

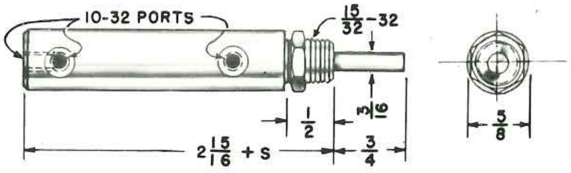
## TYPE 9CS CLEVIS MOUNT, SPRING RETURN



| Stroke (Inches) | ¾ | 1½ | 2¼ | 3 |
|---|---|---|---|---|
| "L" (Inches) | 3 11⁄32 | 4 11⁄16 | 6 1⁄16 | 7 13⁄32 |

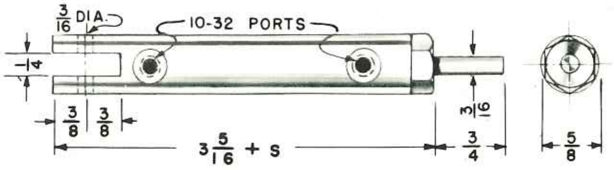
RECOMMENDED FOR AIR ONLY

## TYPE 9SD STUD MOUNT, DOUBLE ACTING



(S) Strokes: 1, 2, 3, 4, 5 or 6 inch.

## TYPE 9CD CLEVIS MOUNT, DOUBLE ACTING



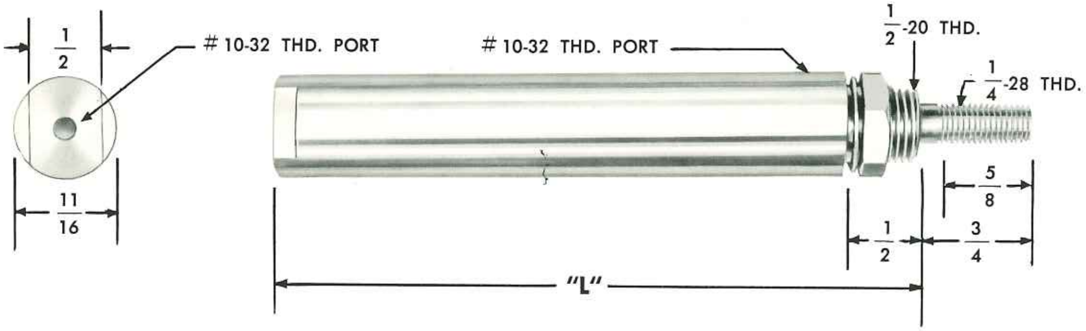
(S) Strokes: 1, 2, 3, 4, 5 or 6 inch.

# 9/16 INCH BORE HEAVY DUTY CYLINDERS

## MAXIMUM WORKING PRESSURE 250 psi AIR — 2000 psi HYDRAULIC, NON-SHOCK

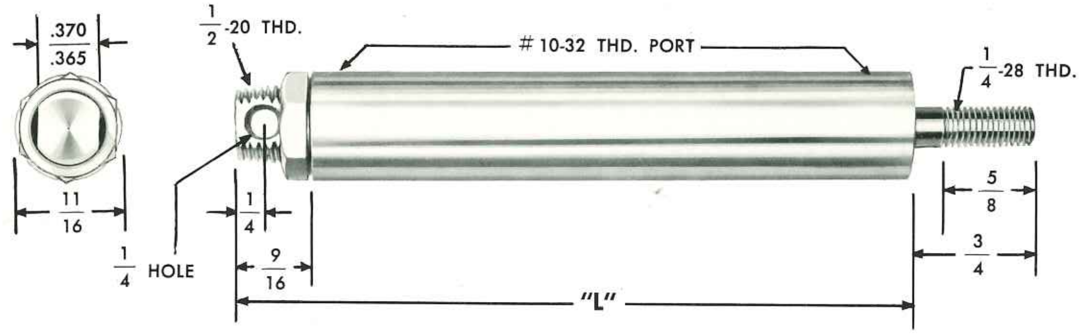
Rugged, powerful new "extra duty" 9/16 inch bore miniature cylinders with all the features desired by designers. Engineered for extra long life and utmost dependability. Compact, sturdy, space-saving fine pitch screw-together construction, with all parts and seals replaceable. Universal, clevis and stud mounts; double acting and spring return. Rods ground and polished 1/4 inch stainless steel. Tubes machined from heavy-walled hard-drawn brass, "ballized" internally for uniform fine finish and low friction. Piston seals are Buna N "T" rings with back up washers on double acting and Block "Vee" on spring return. Shaft seals are self-adjusting Buna N "Vees" with back up washers. Resilient Buna N internal cushions absorb shock, reduce noise and promote long life. Use these sturdy new 9/16 inch bore cylinders for light and heavy duty applications for jigs, fixtures and automation equipment where extra speed and stamina are called for, along with savings in space and operating medium.

### SERIES 9S (Stud Mount) DOUBLE ACTING and SPRING RETURN



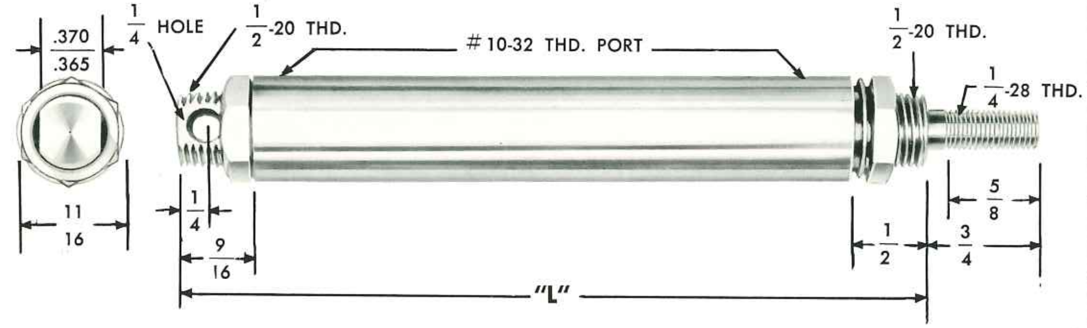
| STROKE | "L" | |
|---|---|---|
| | S Spring Return | D Double Acting |
| 1" | 3 19/32 | 4 7/16 |
| 2" | 5 1/4 | 5 7/16 |
| 3" | 6 29/32 | 6 7/16 |
| 4" | — | 7 7/16 |
| 5" | — | 8 7/16 |
| 6" | — | 9 7/16 |

### SERIES 9C (Clevis Mount) DOUBLE ACTING and SPRING RETURN



| STROKE | "L" | |
|---|---|---|
| | S Spring Return | D Double Acting |
| 1" | 3 7/8 | 4 23/32 |
| 2" | 5 17/32 | 5 23/32 |
| 3" | 7 3/16 | 6 23/32 |
| 4" | — | 7 23/32 |
| 5" | — | 8 23/32 |
| 6" | — | 9 23/32 |

### SERIES 9U (Universal Mount) DOUBLE ACTING and SPRING RETURN



| STROKE | "L" | |
|---|---|---|
| | S Spring Return | D Double Acting |
| 1" | 4 3/8 | 5 7/32 |
| 2" | 6 1/32 | 6 7/32 |
| 3" | 7 11/16 | 7 7/32 |
| 4" | — | 8 7/32 |
| 5" | — | 9 7/32 |
| 6" | — | 10 7/32 |

### USE THESE MODEL NUMBERS WHEN ORDERING 9/16" CYLINDERS ABOVE

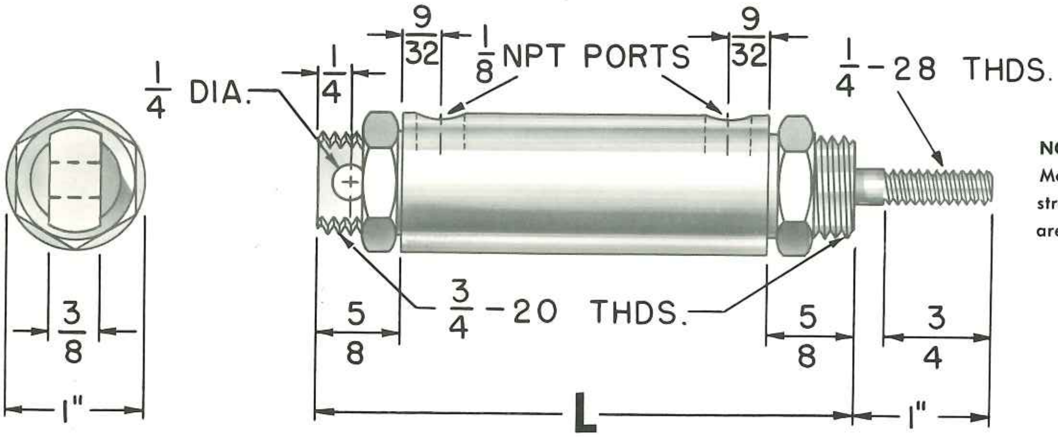
| STROKE | SPRING RETURN | | | DOUBLE ACTION | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1" | 2" | 3" | 1" | 2" | 3" | 4" | 5" | 6" |
| **SERIES 9S** (Stud Mount) | 9S-1S | 9S-2S | 9S-3S | 9S-1D | 9S-2D | 9S-3D | 9S-4D | 9S-5D | 9S-6D |
| **SERIES 9C** (Clevis Mount | 9C-1S | 9C-2S | 9C-3S | 9C-1D | 9C-2D | 9C-3D | 9C-4D | 9C-5D | 9C-6D |
| **SERIES 9U** (Universal Mount) | 9U-1S | 9U-2S | 9U-3S | 9U-1D | 9U-2D | 9U-3D | 9U-4D | 9U-5D | 9U-6D |

# 7/8 INCH BORE HEAVY DUTY CYLINDERS

## MAXIMUM WORKING PRESSURE 250 psi AIR — 2000 psi HYDRAULIC, NON-SHOCK

Here is the ultimate in heavy-duty miniature design — rugged, powerful and compact — for "extra duty" applications requiring maximum thrust, speed and stamina. Universal and stud mount; single and double acting. Space-saving fine pitch screw together construction with all parts and seals replaceable. Rods ground and polished ¼ inch stainless steel. Tubes machined from heavy wall hard-drawn brass "ballized" internally for uniform fine finish and low friction. Piston seals are Buna N "T" rings with back up washers on double acting and Block "Vee" on spring return. Shaft seals are Buna N with back up washers. Internal cushions of resilient Buna N absorb shock, reduce noise and promote long life. Use these sturdy finest quality ⅞ inch bore cylinders in light and heavy duty applications where extra speed, power and stamina, combined with long life and savings in space and operating medium, are required. Ideal for jigs, fixtures and automated equipment.

### Series 7 UNIVERSAL MOUNT CYLINDERS (7S — Single Acting and 7D — Double Acting



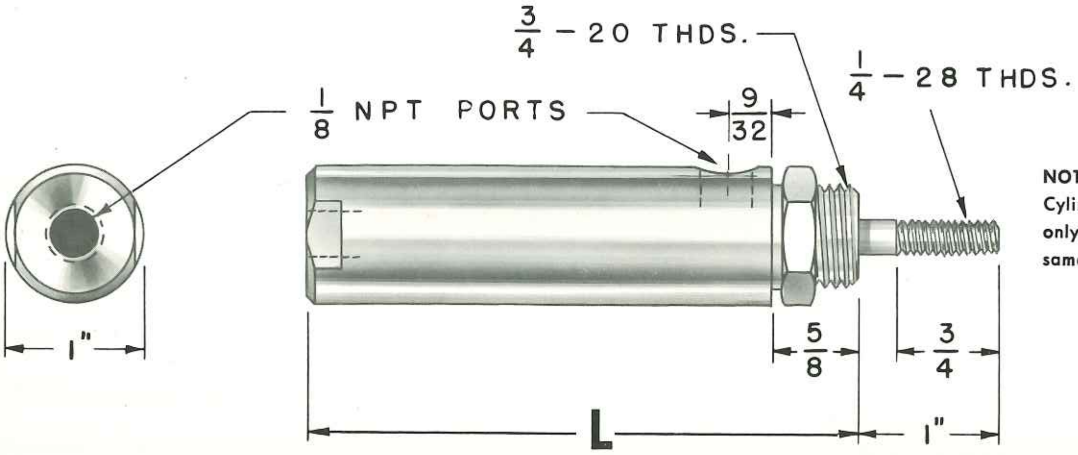
**NOTE:** Spring Return Universal Mount Cylinder is available in 1" stroke only. All other dimensions are same as shown in chart.

### USE MODEL NUMBERS IN CHARTS BELOW WHEN ORDERING ⅞" BORE CYLINDERS

| UNIVERSAL MOUNT | | "L" DIMENSION | |
|---|---|---|---|
| Model | Stroke | Spring Rt. | Double Act. |
| 7S-1 | 1" | 5 9/32 | —— |
| 7D-1 | 1" | —— | 4 7/8" |
| 7D-2 | 2" | —— | 5 7/8" |
| 7D-3 | 3" | —— | 6 7/8" |
| 7D-5 | 5" | —— | 8 7/8" |
| 7D-7 | 7" | —— | 10 7/8" |
| 7D-9 | 9" | —— | 12 7/8" |

| STUD MOUNT | | "L" DIMENSION | |
|---|---|---|---|
| Model | Stroke | Spring Rt. | Double Act. |
| 7SS-1 | 1" | 4 11/32 | —— |
| 7SD-1 | 1" | —— | 3 15/16" |
| 7SD-2 | 2" | —— | 4 15/16" |
| 7SD-3 | 3" | —— | 5 15/16" |
| 7SD-5 | 5" | —— | 7 15/16" |
| 7SD-7 | 7" | —— | 9 15/16" |
| 7SD-9 | 9" | —— | 11 15/16" |

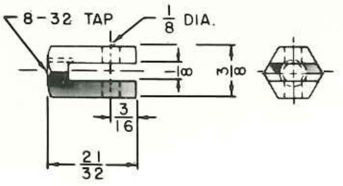
### Series 7 STUD MOUNT CYLINDERS (7SS — Single Acting and 7SD — Double Acting)



**NOTE:** Spring Return Stud Mount Cylinder is available in 1" stroke only. All other dimensions are same as shown in chart.

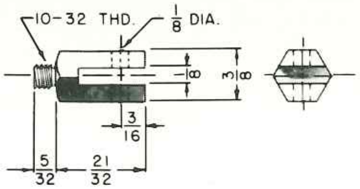
# 3/8 INCH CYLINDER MOUNTINGS and ACCESSORIES

**FEMALE CLEVIS No. 11997**



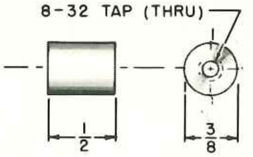
For use with Cylinder having 8-32 threaded shaft.

**MALE CLEVIS No. 11996**



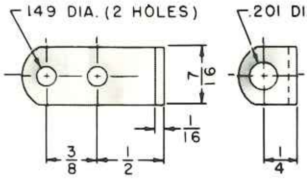
Mounts in rear port of Cylinder tapped 10-32.

**CERAMIC INSULATOR NO. 11767**

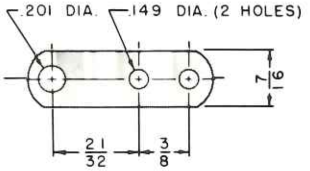


For use with Cylinder having 8-32 threaded shaft to insulate cylinder from heat or electricity.

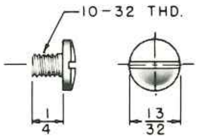
**CYL. MTG. BRACKET (ANGLED) No. 11783**



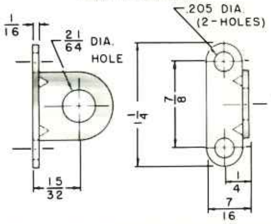
**CYL. MTG. BRACKET (FLAT) No. 11995**



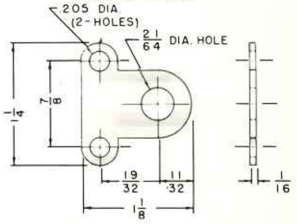
**CYL. MTG. SCREW No. .0022-112**



**MTG. BRACKET (ANGLED) No. 11918-2**



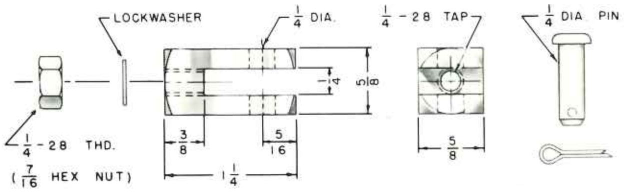
**MTG. BRACKET (FLAT) No. 11917-2**



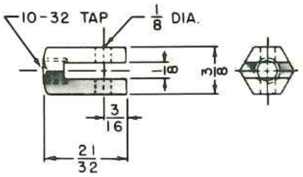
Provides Mounting for Cylinders by use of rear 10-32 port.

# 9/16 INCH CYLINDER MOUNTINGS and ACCESSORIES

**ROD CLEVIS ASSEMBLY No. 15015**

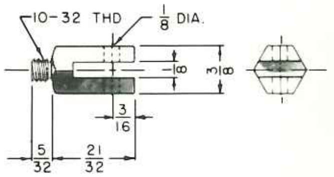


**FEMALE CLEVIS No. 15009**



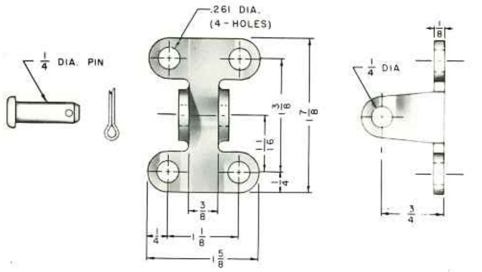
For use with Cylinders having 10-32 threaded shaft.

**MALE CLEVIS No. 11996**

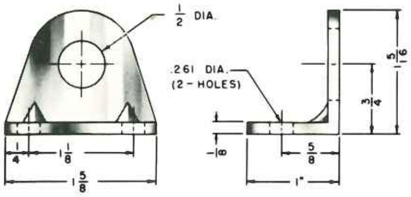


Mounts in rear port of Cylinders tapped 10-32.

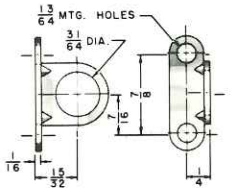
**CLEVIS MOUNTING BRACKET No. 15019**



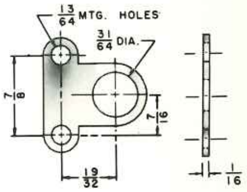
**MTG. BRACKET (ANGLED) NO. 15018-2**



**MTG. BRACKET (ANGLED) No. 11918-1**



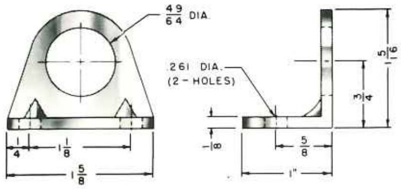
**MTG. BRACKET (FLAT) No. 11917-1**



Provides mounting for Clippard Miniature Valves, or mounting for 9/16" Cylinders.

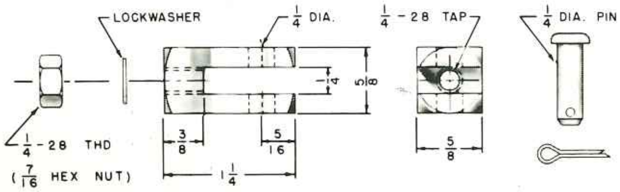
# 7/8 INCH BORE CYLINDER MOUNTINGS and ACCESSORIES

**FOOT MOUNTING BRACKET No. 15018-1**



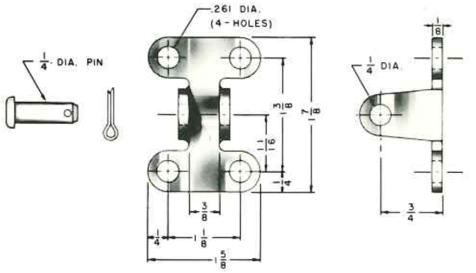
Mounts on front, rear, or both ends of cylinder. Two mounting holes are provided in base for 1/4" bolts (not supplied).

**ROD CLEVIS ASSEMBLY No. 15015**



Rod nut, lock washer, clevis, pin and cotter key will fit all models of Clippard 7/8" bore cylinders. Clevis is made of brass and furnished with plated (swaged) clevis pin.

**CLEVIS MOUNTING BRACKET No. 15019**



## ALSO AVAILABLE, BUT NOT SHOWN

End Seal Assembly No. 12020 for 3BDS, 3CD & 3BDD*

End Seal Assembly No. 17520 for 9BDS, 9CD & 9BDD*

End Seal Assembly No. 17521 for 9/16" Heavy Duty & 7/8" Bore

*(*Two Assemblies Required for Double Ram Models.)*

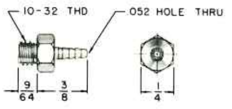
# Clippard MINIATURE FITTINGS

Here is the "plumbing" for Clippard Miniature Valves and Cylinders, designed for greatest flexibility, practical usefulness and savings in time, money and space. Though amazingly compact, all have greater flow capacity than is needed to operate Clippard components and many larger constructions.

Because the smallest size 1/8″ and 1/16″ pipe fittings are too large for Clippard miniatures, 10-32 N.F. machine thread was selected. This is a standard tap and die size found in all shops, extremely handy when you need to make a special fitting in a hurry. Because of their small size, 10-32 fittings, when properly gasketed or "Loctited", will withstand pressures up to 10,000 psi. 10-32 N.F. is also the smallest size permitting maximum flow thru universally standard 1/8″ copper or nylon tubing and plastic, rubber, or braided hose while maintaining reasonable strength.

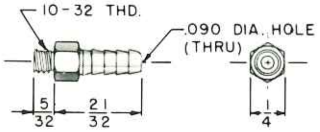
Included here also are many accessories that will save you time, space and cost while adding flexibility and efficiency to your engineering design. All are accurately made from highest quality materials, assuring you of easily maintained circuitry with long, trouble-free operating life.

### SUB-MINIATURE 10-32 to 1/16 HOSE FITTING No. 11752-2



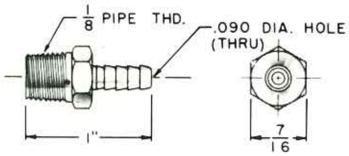
Brass fitting supplied with neoprene gasket and slip-over hose clamp. For use with No. 3814-4 1/16″ sub-miniature hose.

### 10-32 to 1/8 HOSE FITTING No. 11752-1



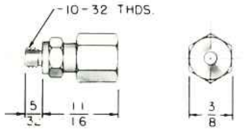
Brass fitting supplied with neoprene gasket. For use with hose Nos. 11763, 11765, 3814-1, or 3814-3 and hose clamp No. 5000-2.

### 1/8 PIPE to 1/8 HOSE FITTING No. 11924



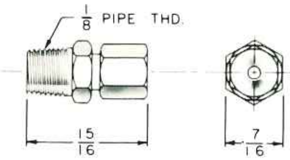
Brass fitting joins standard pipe to hose Nos. 11763, 11765, 3814-1, or 3814-3. Use with hose clamp No. 5000-2.

### 10-32 to 1/8 TUBING CONNECTOR No. 11923



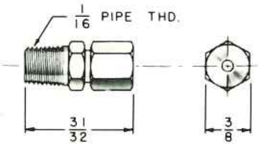
Brass ferrule type fitting supplied with neoprene gasket. For use with No. 3811-1 copper or No. 3814-2 nylon tubing.

### 1/8 PIPE to 1/8 TUBING CONNECTOR No. 3810-1



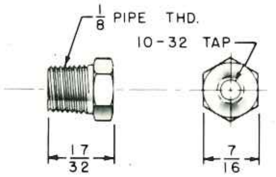
This brass ferrule type pipe fitting joins standard 1/8″ pipe to No. 3811-1 copper or No. 3814-2 nylon tubing.

### 1/16″ PIPE to 1/8″ TUBING CONNECTOR No. 3810-2



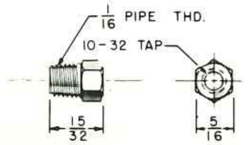
This brass ferrule type pipe fitting joins standard 1/16″ pipe to No. 3811-1 copper or 3814-2 nylon tubing.

### 1/8″ PIPE to FEMALE 10-32 ADAPTOR No. 15006-1



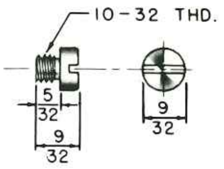
Made of brass. Will adapt 1/8″ standard pipe to 10-32 fittings and Clippard Miniature Devices.

### 1/16″ PIPE to FEMALE 10-32 ADAPTOR No. 15006-2



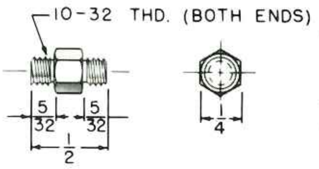
Made of brass. Will adapt standard 1/16″ pipe to 10-32 fittings and Clippard Miniature Devices.

### SCREW PLUG No. 11755



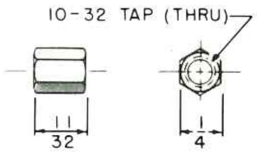
Brass plug supplied with gasket may be used for plugging unused ports in MAN-12 Manifold, air lines and other devices. May be used for converting the MAV-4 & MAV-4D into a normally open or normally closed Three-Way Valve.

### SHORT COUPLING No. 11999



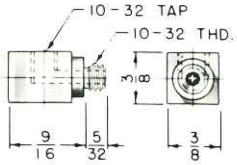
This miniature brass nipple comes supplied with two neoprene gaskets. May be used for coupling cylinders directly to valves, etc.

### FEMALE HEX CONNECTOR No. 15004



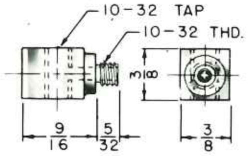
This brass coupling is for joining two 10-32 male fittings.

### "L" FITTING No. 15002-2



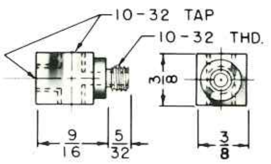
Miniature brass elbow supplied with gasket. Allows port to be brought out 90° to the side. For exact positioning use "Loctite" cement or No. 11761 "Lead" Gasket.

### "T" FITTING No. 15002-3



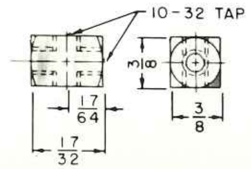
Miniature brass "T" is same as "L" fitting except for ports out both sides. Supplied with neoprene gasket but for precise positioning, use "Loctite" cement or No. 11761 "Lead" Gasket.

### "X" FITTING No. 15002-4



Miniature brass fitting same as above, but ports drilled in three directions. May be used as a miniature manifold or as an "L" or "T" fitting by plugging unused ports with screw plug. Supplied with neoprene gasket, however, "Loctite" or No. 11761 "Lead" Gasket may be used for precise positioning of ports.

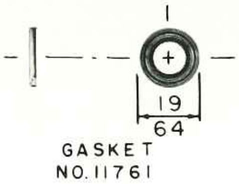
### "X" COUPLING No. 15002-5



Small brass fitting is same as above except all ports are female. Ideal for use as a small manifold.

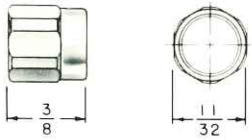
# Clippard MINIATURE GASKETS, TUBING, HOSE and CLAMPS

### NEOPRENE GASKET No. 11761



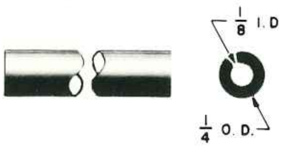
For use with all Clippard fittings having 10-32 male thread. Material is .018" thick neoprene. .035" thick lead gaskets are also available on request for use where elbows, tees, etc., must come out on a definite heading. If lead is desired, specify No. 11761 "Lead" on your order.

### HOSE CLAMP No. 5000-2



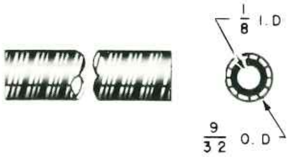
Self-threading reusable type. Recommended for use with all Clippard hose and hose fittings, except sub-miniature. To install, slip sleeve over hose, push onto fitting, then screw into place. Tighten with hand or wrench.

### BUNA N HOSE No. 11765



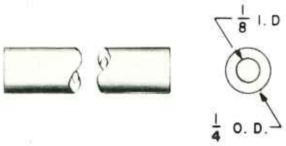
Flexible, low pressure hose of Buna N Compound is impervious to most oils and fluids. Color is black. Recommended for low pressure applications under 60 psi. Static bursting point is approximately 185 psi. Hose fits No. 11752-1 and No. 11924 hose fittings. Use of hose clamp No. 5000-2 is recommended.

### BRAIDED HOSE No. 11763



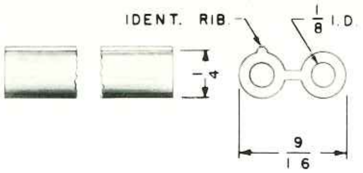
Same flexible Buna N hose shown above but with yellow and black cotton braid covering to give it a working range of 0 to 150 psi. Static bursting point approximately 600 psi. For use with No. 11752-1 and No. 11924 hose fittings and No. 5000-2 hose clamps.

### VINYL HOSE No. 3814-1



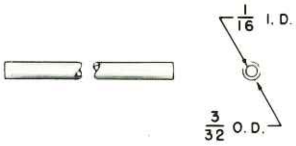
Flexible, durable plastic hose, Navy Grey Color. Will not crack or craze with age. Impervious to most fluids and oils. Recommended working range is 0 to 125 psi. Static burst pressure approximately 425 psi at 70° F. For use with No. 11752-1 and No. 11924 hose fittings and No. 5000-2 hose clamps.

### TWIN VINYL HOSE No. 3814-3



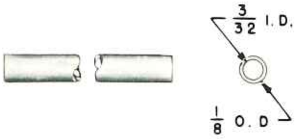
Same as No. 3814-1 except hose is molded together. One side has beaded rib running entire length for identification. Ideal for feeding supply in on one line and out on the other. Reduces labor and provides means for neat assembly. Hose may be parted with any sharp cutting edge.

### VINYL HOSE No. 3814-4



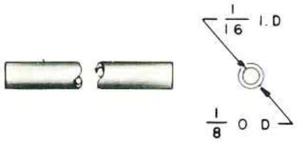
Flexible, durable plastic hose, black or clear, made especially for use with Sub-Miniature Hose Fitting No. 11752-2. Recommended working range is 0 to 60 psi. Static bursting point is approximately 240 psi at 70° F.

### NYLON TUBING No. 3814-2



Semi-Flexible tubing may be formed into sharp bends with heat. Color is white. Due to material strength and small area, it may be used with pressures to 1000 psi. Static Burst pressures approximately 4000 psi. Suitable for use with ferrule tubing connectors No. 11923 and No. 3810-1 and No. 3810-2.

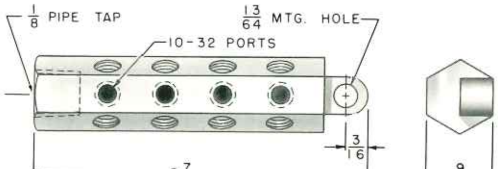
### COPPER TUBING No. 3811-1



High pressure tubing for working pressures to 2500 psi. Static burst pressure in excess of 10,000 psi. Suitable for use with ferrule tubing connectors No. 11923, No. 3810-1 and No. 3810-2.

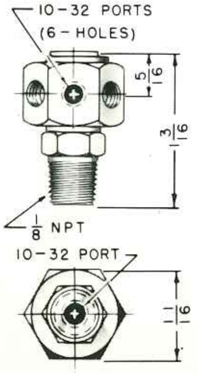
# Clippard MINIATURE AIR MANIFOLDS

### 12-PORT MANIFOLD — Model MAN-12



Machined from sturdy brass hex stock. May be mounted on jigs, fixtures, or machinery to provide up to 12 convenient 10-32 outlets from one standard ⅛" pipe connection. May be used with any Clippard 10-32 fittings, Quick Connects, and many other devices. Unused ports can be plugged with Clippard No. 11755 Screw Plugs and Gaskets.

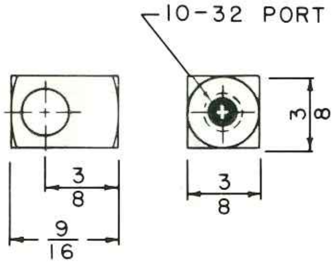
### ROTARY MANIFOLD — Model MRM-6



May be used either as a swivel joint, or as a stationary manifold. Ideal for distributing air or liquid supply from the center column onto a revolving index table. Provides up to six 10-32 supply ports from each ⅛" pipe connection. Intake may be used as either a ⅛" NPT male thread, or 10-32 port. Output consists of six ports tapped for 10-32 fittings. Unused ports may be plugged with Clippard No. 11755 Screw Plugs and Gaskets. Constructed of brass and silicon bronze with Buna N seals. AIR FLOW RATE at 50 psi is: 5.9 CFM. RECOMMENDED WORKING RANGE is: up to 250 psi.

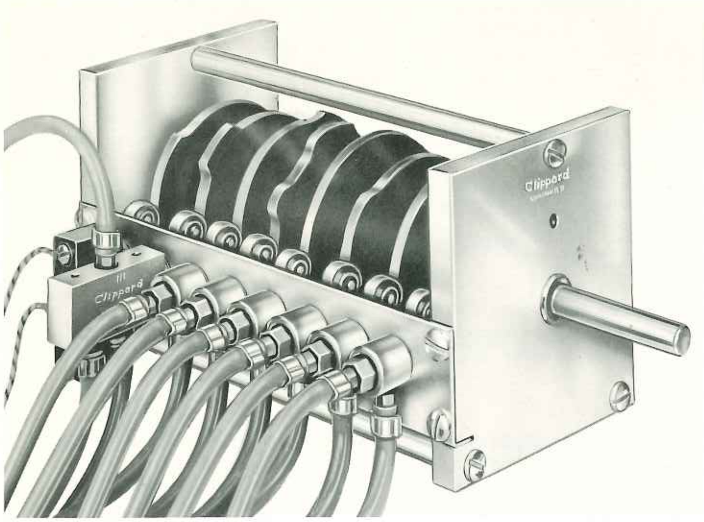
### SOLDER TUBE OUTLETS

#### Model STO-1 for ¼" Tubing — Model STO-2 for 5/16" Tubing



These brass STO's form convenient 10-32 outlets anywhere along a length of copper tubing. String them on the tubing like beads, position, and sweat solder into place. Punch or drill a hole through the port (into the tubing), turn on air momentarily to blow chips out through end of tube, then secure end of tubing, and tubing is ready with convenient outlets for Clippard fittings, quick connects, or devices. Excellent for inexpensive "airing up" of benches and machinery to avoid expensive plumbing. When not in use may be plugged with No. 11755 screw plug and gasket.

# Clippard MINIMATIC SEQUENCE PROGRAMER • MSP



## CONSTRUCTION FEATURES

1. Self-Lubricating Bearings.
2. ⅜" Steel Shaft, Extendible out Either or Both ends for Tandem Operation.
3. 1-Piece Phenolic Cams — Long Lasting, Easily Machined.
4. Cams easily adjusted on shaft with one set screw.
5. Units accommodate 4 to 14 cams.
6. Mounting brackets Accommodate 4 to 14 Clippard Cam Followers and Air Valves, or Electrical Switches.
7. End plates Tapped for Mounting Bottom or Rear.
8. Positive Cam Indexing assured thru Alignment Holes in Cams and End Blocks.
9. End Blocks Heavy Aluminum.
10. Rigid Channel Steel Mounting Bracket for Valves or Switches.

### FOR PRECISE TIMING AND CYCLING OF . . .

# AUTOMATIC WORK OPERATIONS with AIR OR ELECTRICITY

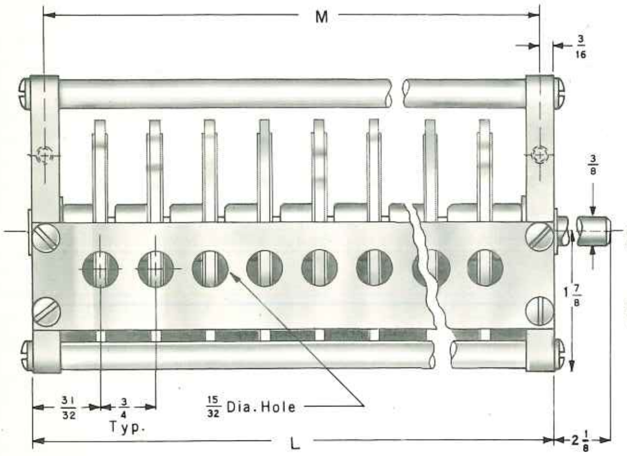
### CONTROLS FEEDING DEVICES, AUTOMATION EQUIPMENT, PACKAGING MACHINERY, ETC. — FOR CONTROLLING OR PERFORMING THOUSANDS OF AUTOMATIC WORK FUNCTIONS.

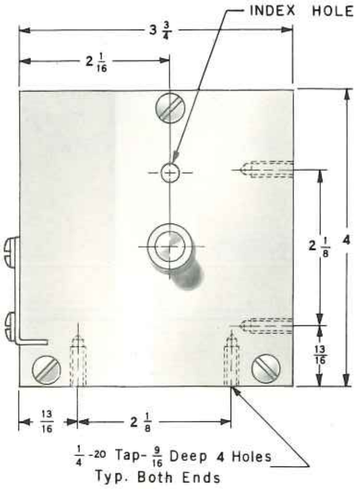
Clippard Sequence Programers may be powered directly from the machine they control, or by any small geared-down motor. Correct direction of rotation may be observed by driving unit from either end. Shafts may be coupled together for tandem operation.

Clippard Programers operate up to fourteen Clippard standard two-way, three-way, or four-way valves with cam followers No. 11925 (shown on the opposite page) and are suitable for use with many small snap action type switches such as Clippard ES-1. Valves on this unit may control large pilot operated valves, or be connected directly to cylinders, eliminating costly switches and solenoid valves. An excellent device for operating in explosive atmospheres.

Cams for this unit are of solid one-piece phenolic material that will last almost indefinitely and can never get out of adjustment. A selection of eight standard cam cuts (shown on the opposite page) is available to fill over 90% of requirements. Special cuts, according to your sketches may be supplied at nominal cost, or inexpensive cam blanks furnished for your own machining if desired. Initial alignment of cams can easily be accomplished by inserting a 3/16" rod through the indexing holes (reference holes) in unit and cams. Individual cams are quickly adjusted on programer shaft, with a single set screw in the hub. Once aligned and set screws tightened, the sequence is permanently fixed.

For the most effective use of this unit, specify Clippard Minimatic Valves, Electrical Switch and Cylinders. Send for brochures on Clippard Miniature Valves, Cylinders and Fittings and Accessories.

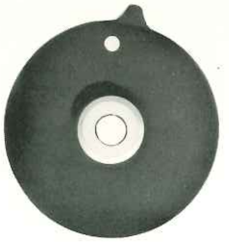


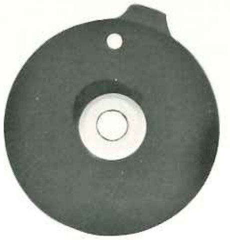


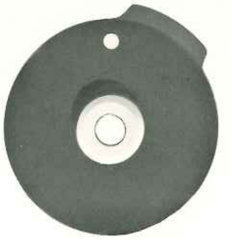
| MODEL NO. | "L" DIMENSION | "M" DIMENSION |
|---|---|---|
| MSP-4 (4 Cams) | $4\frac{5}{32}$" | $3\frac{25}{32}$" |
| MSP-6 (6 Cams) | $5\frac{21}{32}$" | $5\frac{9}{32}$" |
| MSP-8 (8 Cams) | $7\frac{5}{32}$" | $6\frac{25}{32}$" |
| MSP-10 (10 Cams) | $8\frac{21}{32}$" | $8\frac{9}{32}$" |
| MSP-12 (12 Cams) | $10\frac{5}{32}$" | $9\frac{25}{32}$" |
| MSP-14 (14 Cams) | $11\frac{21}{32}$" | $11\frac{9}{32}$" |

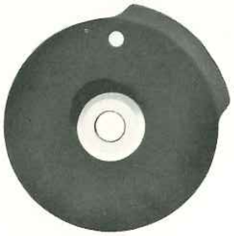
**THE LIST PRICE OF THESE UNITS INCLUDES VALVE MOUNTING BRACKETS, CAMS - STANDARD CUT, OR BLANK - PLUS ALLEN WRENCH**

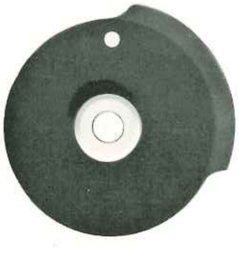
# *Clippard* PROGRAMER CAMS

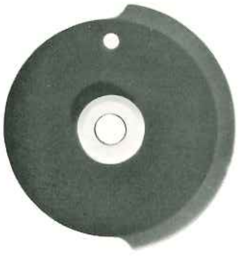

C33 - 15
(15° lobe)

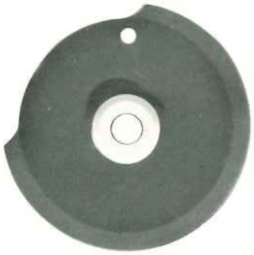

C33 - 30
(30° lobe)

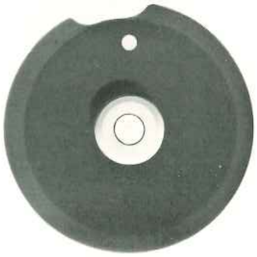

C33 - 60
(60° lobe)


C33 - 90
(90° lobe)


C33 - 120
(120° lobe)


C33 - 180
(180° lobe)


C33 - 270
(270° lobe)


C33 - 340
(340° lobe)

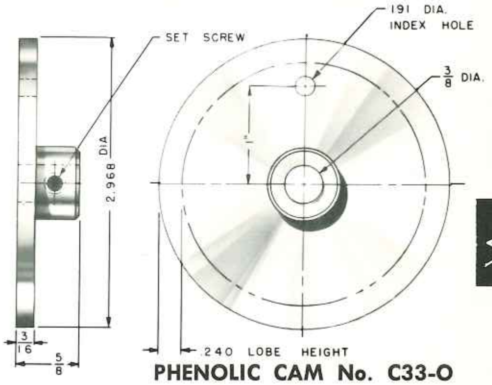
**Note: Degrees of cam lobe denotes approximate ON TIME using Clippard No. 11925 Cam Follower Head**

Cams are made of durable, extra long lasting one piece phenolic material, with a cadmium plated brass center hub. Each cam is quickly adjusted on programer shaft with a single 10-32 screw with a nylon tip in the hub. 3/16″ index holes are provided at 0° position for reference and positive positioning. Initial alignment of cams can easily be accomplished by inserting a 3/16″ rod through these index holes in cams and end plates of unit. The eight standard cams shown above will fit the majority of requirements but special cuts can be supplied.

When ordering Programer Units, specify any combination of blank or standard cams (by part number) as shown above.

Should special cuts be needed, they are available at nominal cost. Just send us a rough sketch of your requirements drawn on a 3″ diameter circle.

Uncut blank cams, No. C33-O, may be ordered for your own machining if preferred. Cams may be easily machined with an end-mill, saw, or belt sander, and touched up with a file.

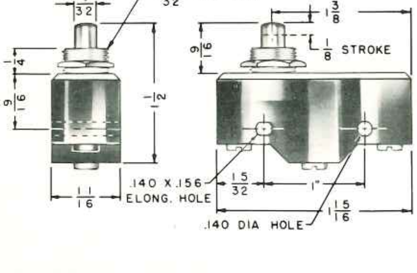


**PHENOLIC CAM No. C33-O**

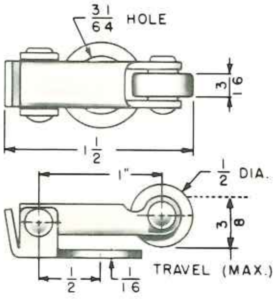
# *Clippard* PROGRAMER ACCESSORIES

Accessories shown below are engineered to make the Clippard Sequence Programer the most flexible and useful unit on the market. Electrical Switch ES-1 and 2, 3 and 4 way Valves, MAV-2, MAV-3 and MAV-4, are dimensioned for precise fit thru the programer's rigid mounting bracket. Cam Follower Head No. 11925, likewise, fits precisely over the threaded shoulders of valves or switches, and is secured in place with the lock washers and mounting nuts provided with the valves or switches. When ordering the programer, be sure to order the Clippard Valves, Switches and Cam Follower Heads needed for your particular application.

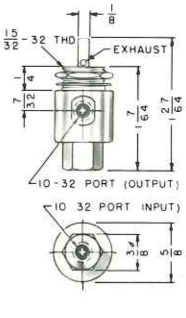
**Single Pole, Double Throw**
**ELECTRICAL SWITCH Model ES-1**



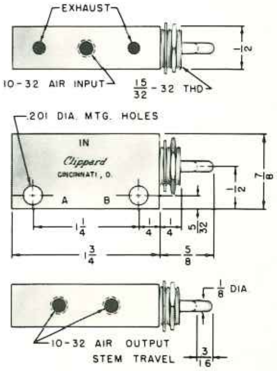
Maximum rating: 15 amperes at 120, 240 or 480 volts AC; 0.5 amperes at 125 volts DC; 0.25 amperes at 250 volts DC.



**CAM**
**FOLLOWER HEAD**
**No. 11925**



**2-WAY AIR VALVE —**
**Model MAV-2 or**
**3-WAY AIR VALVE —**
**Model MAV-3**

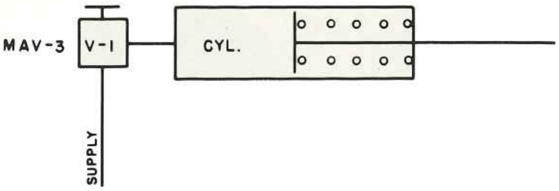


**4-WAY AIR VALVE —**
**Model MAV-4**

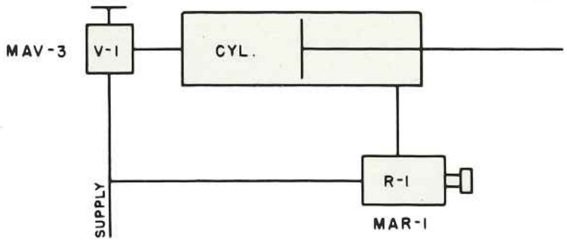
*Clippard Instrument Laboratory, Inc., is constantly striving to improve its products and reserves the right to change materials and designs without notice.*

# ....TYPICAL CIRCUITS USING *Clippard*

## SPRING RETURN CYLINDERS

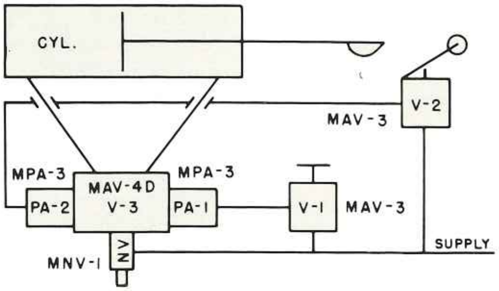


3-Way valve, V-1, operates spring return cylinder above.



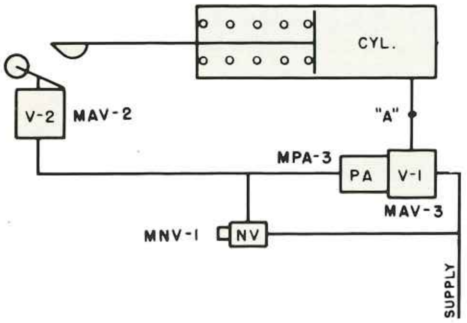
Self-relieving type regulator provides "air-spring" in a double acting cylinder where long stroke requirements make ordinary spring return cylinders impractical. Single 3-way valve, V-1, operates cylinder; lower pressure through regulator returns piston with adjustable uniform force.

## ONE CYCLE CIRCUIT



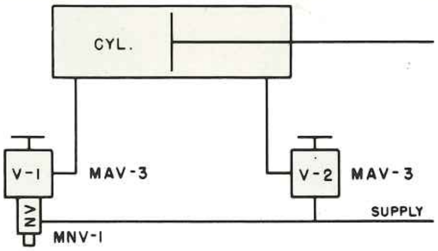
When 3-way valve, V-1, is pressed, pilot operated 4-way valve, V-3, shifts to start cylinder. At end of stroke piston trips V-2 which again shifts V-3 to return piston for complete cycle. Cylinder can power cross-slides, drilling operations, indexing, etc.

## TIMING CIRCUIT

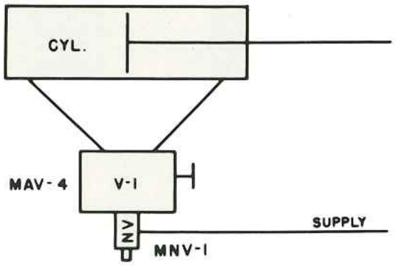


Air bleeding thru needle valve, NV, pilot operates 3-way valve, V-1, to extend cylinder. Piston then trips V-2 to exhaust pilot valve V-1 to atmosphere which returns piston. Speed of cycle is adjusted with needle valve. Circuit can operate additional cylinders or larger pilot valves from point "A". If necessary use a flow control valve between point "A" and cylinder to permit auxiliary equipment to operate before piston extends fully to reverse cycle.

## DOUBLE ACTING CYLINDERS

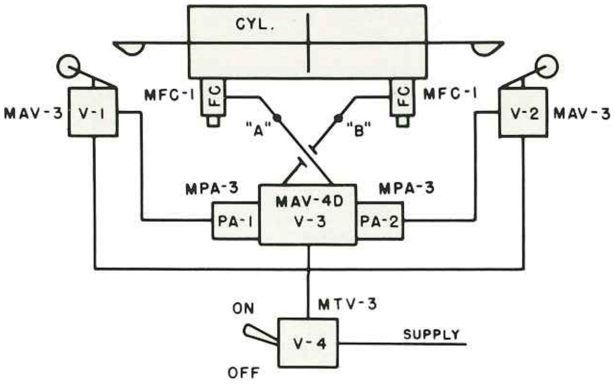


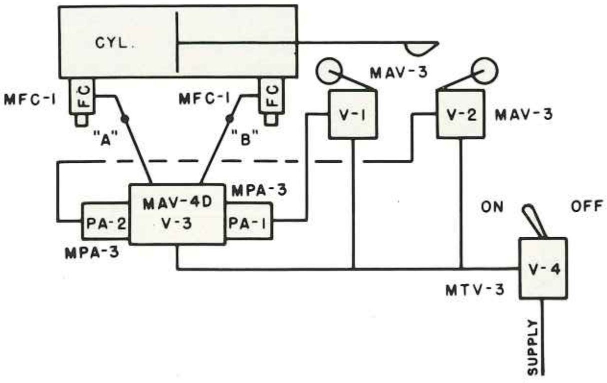
Two 3-way valves operating a double acting cylinder. When valves are released, cylinder is depressurized. Needle valve at inlet of V-1 regulates speed of piston extension. If desired, additional needle valve may be used at V-2 to regulate return speed.



A two position 4-way valve operating a double acting cylinder. When depressed, valve extends piston and holds it under pressure. When released piston retracts and is held by pressure. Needle valve in supply line controls speed in both directions. Flow control valves may be used in valve-to-cylinder lines to control piston speed in each direction.

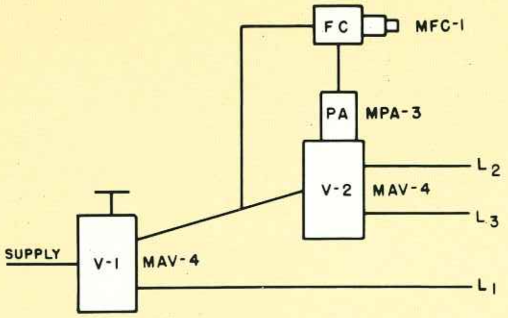
## AUTOMATIC CYCLE CIRCUIT





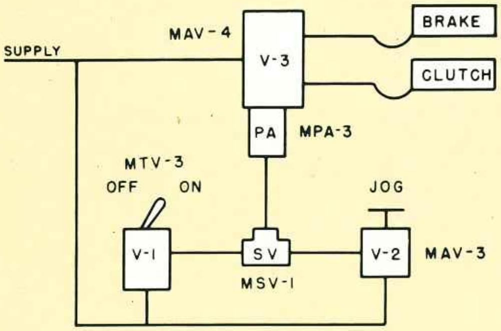
The two diagrams above are essentially the same as the One Cycle circuit except cylinder trips V-1 on return stroke. Since cycles are of uniform duration and adjustable through use of flow control valves to give desired dwell and speeds, circuit may be used as a pneumatic timer to control additional cylinders and larger pilot valves at identical speeds from points "A" and "B". Master "off-on" switch (Toggle Valve) is provided in supply line.

## AIR IMPULSE



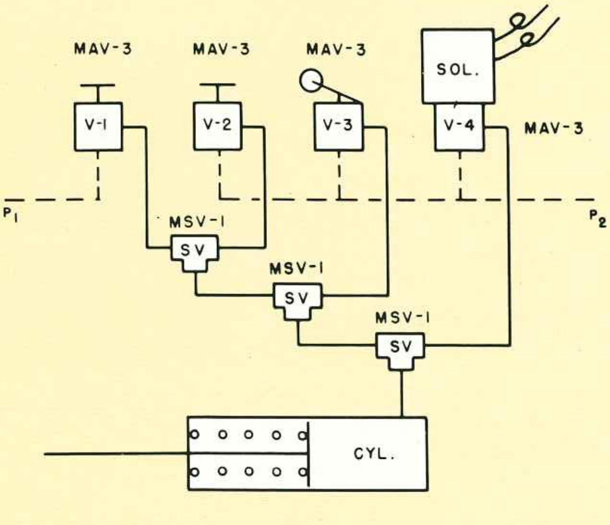
In above circuit, when 4-way valve V-1 is depressed, $L^1$ has continuous flow. When V-1 is released $L^2$ gets an air impulse then $L^3$ turns on. Flow control valve measures duration of impulse in $L^2$ and delay in $L^3$. $L^1$ and $L^3$ may be plugged if only impulse is needed. $L^1$ and $L^2$ plugged gives only time delay.

## OPERATING CLUTCH AND BRAKE



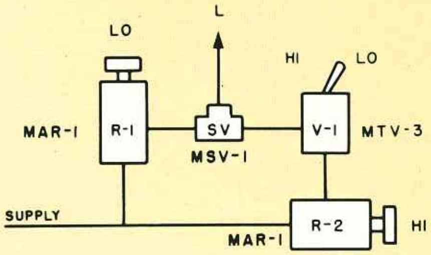
In the above circuit the "off-on" toggle valve pilot operates the 4-way valve V-3 through one side of the shuttle valve, SV. V-3 alternately operates clutch and brake. Push button 3-way valve provides "Jogging" through other side of shuttle valve.

## USE OF SHUTTLE VALVES



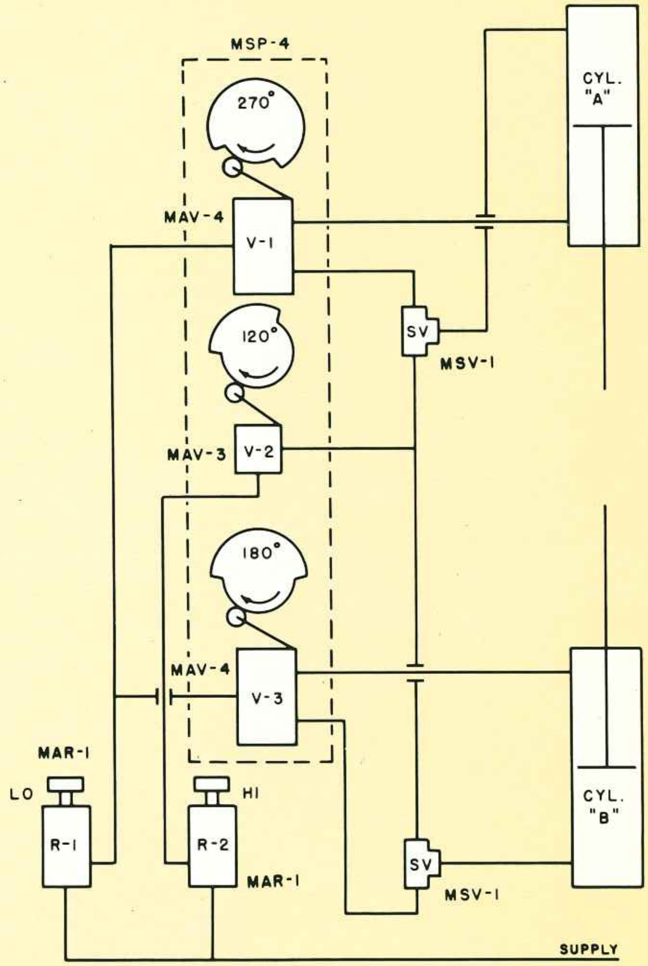
Shuttle valves permit operation of single cylinder or pilot valve from several control valves at different locations or from different pressure sources. In example above, cylinder is operated manually by a push button at V-2, cam follower at V-3, or by electric signal at V-4. All from pressure source P-2. V-1 actuates cylinder from higher pressure P-1. Any number of control valves may be used by adding more shuttle valves. Exhaust is through valve where pressure was last applied.

## SELECTION OF PRESET PRESSURES



When toggle valve V-1 is "On", higher pressure from Regulator R-2 overides shuttle valve SV to connect flow to L. With V-1 "off" lower pressure from R-1 is to L.

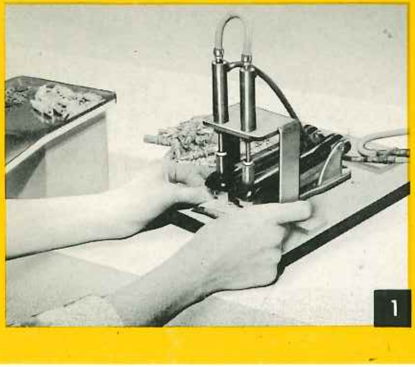
## CIRCUIT USING SEQUENCE PROGRAMER



Example shows sequence programer (dotted line) controlling two cylinders while crimping a part on an index table. Regulator R-1 is set for low pressure for positioning cylinders; R-2 is set for high pressure for crimping operation. Sequence is as follows:

1) 4-way valve V-1 extends cylinder A against part with low force.
2) 4-way valve V-3 extends cylinder B against part with low force.
3) 3-way valve V-2 overides shuttle valves SV with high pressure increasing force of both cylinders for crimping.
4) V-2 closes, decreasing force of both cylinders while V-3 retracts cylinder B.
5) V-1 retracts cylinder A.

A fourth cam on programer can be used to index the table, operate a counter, or turn itself off after each cycle through use of a Clippard ES-1 electric switch and cam follower.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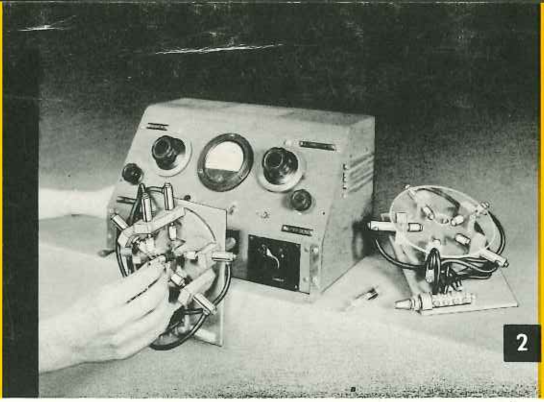
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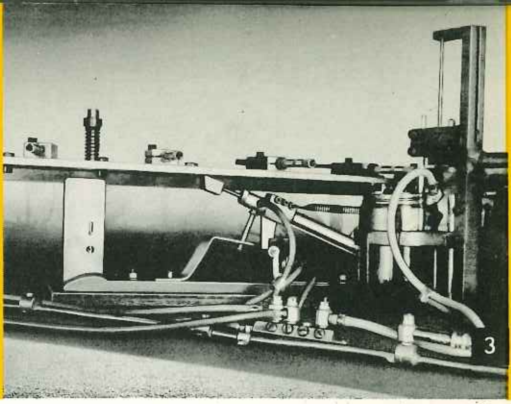
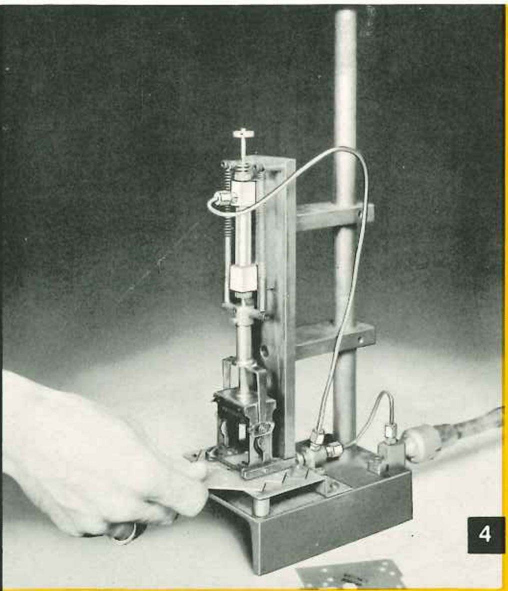

3

# Some interesting "IN USE" applications for Clippard Minimatic

## CYLINDERS, VALVES, PROGRAMER, MANIFOLDS, FITTINGS AND ACCESSORIES

1. OFFICE STAPLERS powered by Clippard 9SS-¾ cylinders. Notice quick connects on rear of jig for attaching foot operated valve.
2. ELECTRICAL TEST JIG using Clippard 3PS-½ cylinders with No. 11767 ceramic insulators. Plastic shield is used for high voltage tests.
3. INDEXING TABLE actuated by Clippard 9CD cylinder.
4. SELF-INKING office stamp automated with Clippard ⅜" bore cylinder and 3-way valve. Ideal for quick stamping of parts numbers, dates, etc.
5. WIRE CUTTER operated by 9BS-¾ cylinder. Cylinder in rear forms wire.
6. COLLET on hand screw machine actuated by Clippard ⅞" bore cylinder. Notice 3-way valves on cross slide lever, giving operator finger tip control.
7. MINIATURE plastic injection molding press programed with Clippard Minimatic components. Notice Clippard sequence programer, at top left, with bead chain drive operating bank of 3-way valves.
8. PNEUMATIC TIMER circuit using Clippard components. Can be used for controlling larger pilot valves or cylinders. Circuit shown on page 18. Notice miniature quick connect take offs.
9. NAME ROLLING DEVICE powered by Clippard ⅞" bore cylinders. Notice foot operated valve made from MAV-3, connected to jig thru Clippard dual hose and quick connect units.
10. SOLDER POT raised and lowered by Clippard 9/16" bore cylinder. Swing wiper is actuated by type 3CD cylinder.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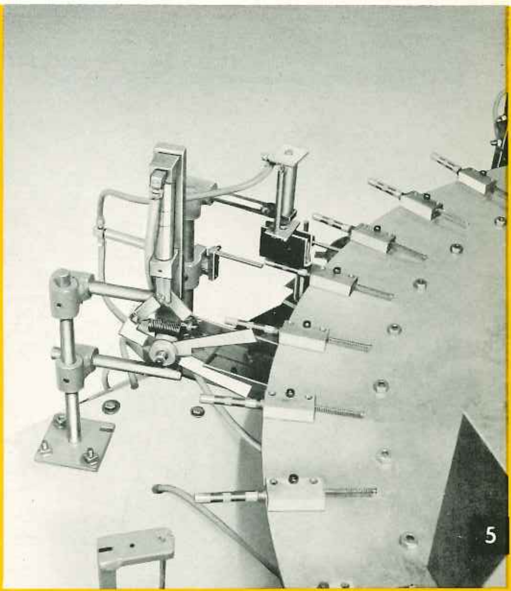
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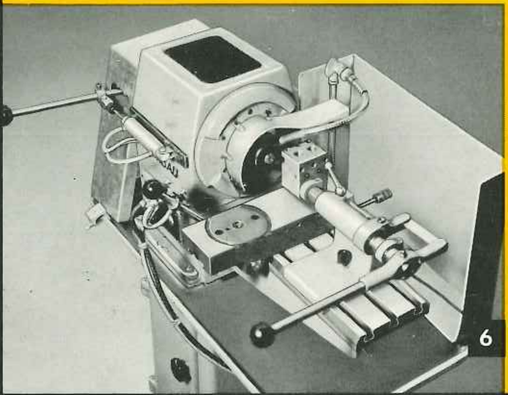
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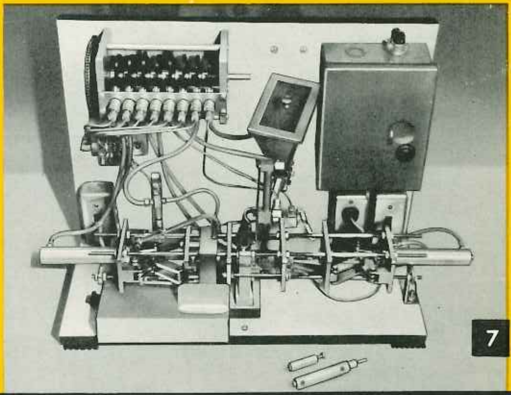
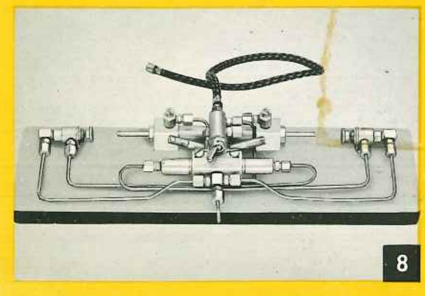

7

*Pioneers in the manufacture of Miniature Fluid Power Devices,*

*R.F. Coils, Electronic Test Equipment*

**Clippard** INSTRUMENT LABORATORY, INC.
7390 COLERAIN ROAD, CINCINNATI 39, OHIO
Telephone: 521-4261 • Area Code: 513

EXPORT DIVISION: ROCKE INTERNATIONAL CORPORATION, 13 East 40th St., New York 16, N. Y., U.S.A.
*PHONE: MUrray Hill 9-0200 • CABLE: ARLAB (N. Y. all codes)*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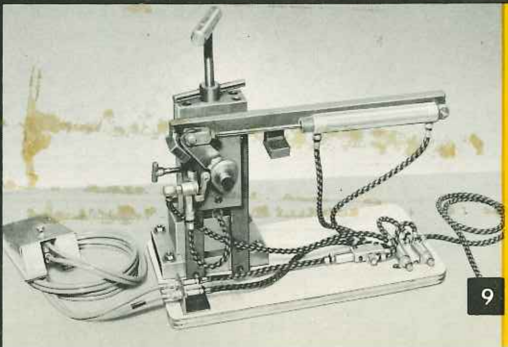
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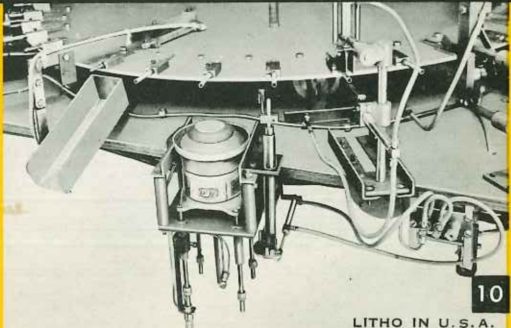
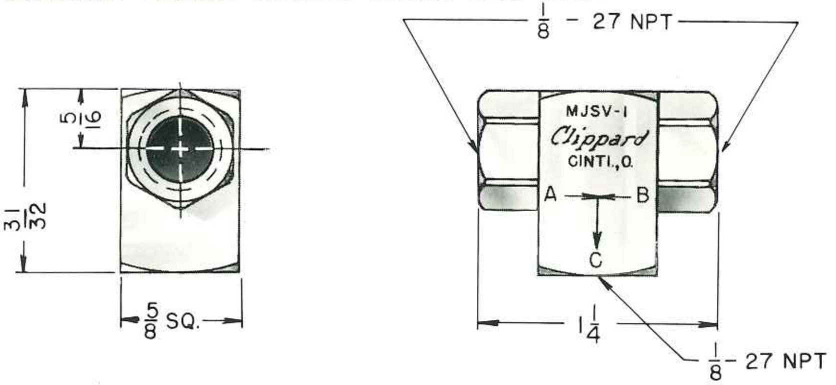

10

LITHO IN U.S.A.

# *Clippard* MINIATURE FLOW VALVES

## NEW MINIATURE "JUMBO" SHUTTLE VALVE (DOUBLE CHECK VALVE) Model No. MJSV-1

DRAWING SHOWS
UNIT ACTUAL
SIZE



Start or stop a machine from any of many locations, provide a "panic" stop button at any position on an assembly line, actuate a control valve or cylinder from several different sources. These are but a few of the many services offered by a shuttle valve in modern fluid power circuitry. See "USE OF SHUTTLE VALVE" circuit, at top left, on the back of this bulletin.

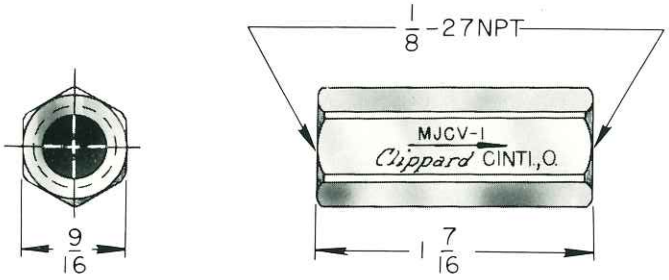
The MJSV-1 is a new and improved shuttle or "double check" valve with greatly increased flow capacity, and ⅛ NPT porting, making it ideal for use with Clippard's Miniature "Jumbo" 2 and 3 way valves, MJV-2, MJV-3.

In the drawing above, ports "A" and "B" are for inputs. Port "C" is output. Flow is from "A" to "C" or "B" to "C", but never from "A" to "B" or "B" to "A". Exhaust is thru port where pressure was last applied, i.e., if pressure is applied thru "A", exhaust is "C" to "A".

The MJSV-1 is machined from brass, bright dipped for appearance and corrosion resistance. Buna N material, impervious to most fluid power fluids, is used for seals. All ports are tapped ⅛ NPT. The guided spool inside valve offers a positive shift at pressures as low as 5 psi. Where lower pressures, less flow and 10-32 porting are used, see Clippard Catalog for Model MSV-1 shuttle valve.

## NEW MINIATURE "JUMBO" CHECK VALVE Model No. MJCV-1

DRAWING SHOWS
UNITS ACTUAL
SIZE



MJCV-1 is a new and improved poppet type check valve (permitting flow in one direction only) with ⅛-27 NPT porting. Because of greatly increased flow capacity it is ideal for use with Clippard's new "JUMBO" 2 and 3 way valves, MJV-2 and 3, and the new "JUMBO" Shuttle Valve, MJSV-1, shown above. Unit is machined from brass and stainless steel. Seals are Buna-N. Finish is bright dipped for appearance and corrosion resistance. Where less flow is required and 10-32 ports are used, see Clippard Catalog for Model MCV-1 Check Valve.

### DESIGN AND PERFORMANCE DATA

| MODEL NUMBER | MJSV-1 | MJCV-1 |
|---|---|---|
| Type | SHUTTLE<br>(Double Check) | CHECK |
| Medium | Air or Hyd. | Air or Hyd. |
| Rec. Working Range (Psi) | 5 to 300 Air<br>5 to 1000 Hyd. | 0 to 300 Air<br>0 to 1000 Hyd. |
| Flow @ 50 psi Air (CFM) | 14 | 13 |
| Flow @ 100 psi Air (CFM) | 26 | 24 |
| Temperature Range | —30°F to +230°F | |

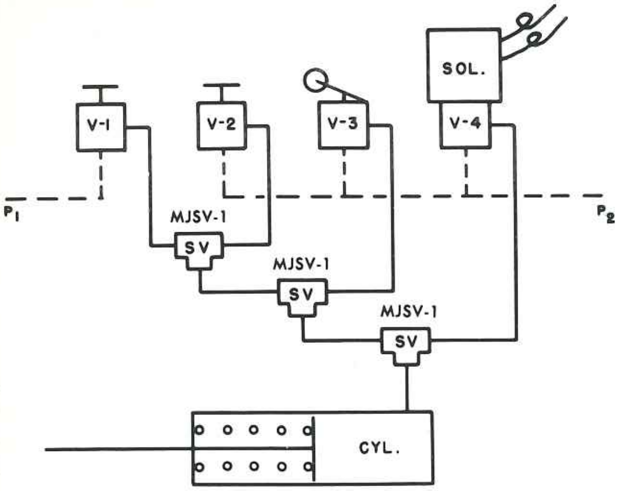
*See reverse side of this sheet for Circuitry Suggestions*

→

# CIRCUITRY SUGGESTIONS FOR *Clippard* MJSV-1 MINIATURE "JUMBO" SHUTTLE VALVE (DOUBLE CHECK VALVE) AND CHECK VALVE

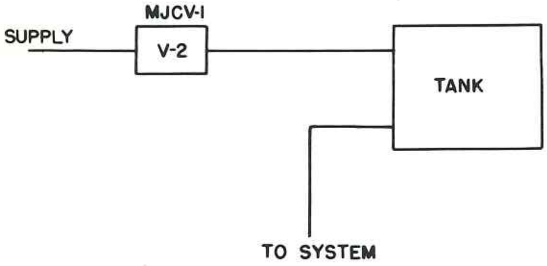
**Bulletin No. 164**

## USE OF SHUTTLE VALVES



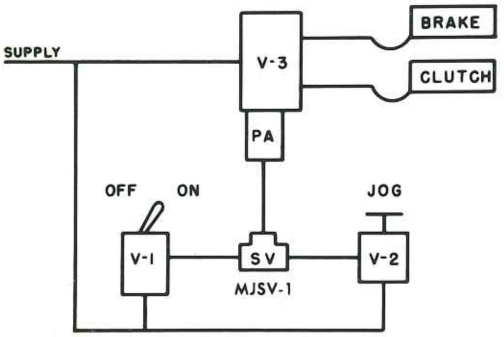
Shuttle valves permit operation of single cylinder or pilot valve from several control valves at different locations or from different pressure sources. In example above, cylinder is operated manually by a push button at V-2, cam follower at V-3, or by electric signal at V-4. All from pressure sources P-2. V-1 actuates cylinder from higher pressure P-1. Any number of control valves may be used by adding more shuttle valves. Exhaust is through valve where pressure was last applied.

## USE OF CHECK VALVE



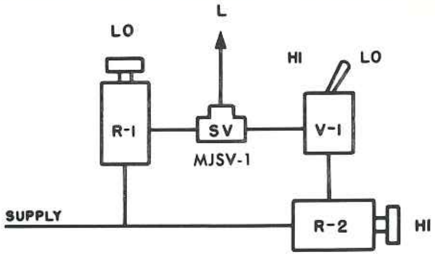
This circuit offers a most economical means of providing a constant pressure source at a remote location, ideal for the operation of low-demand Clippard components, or intermittent operation of higher demand devices. It also offers a constant pressure source for "fail-safe" systems. Small diameter tubing is run from main supply to check valve at a distant storage tank. System is actuated from constant pressure in tank even though supply pressure may vary or fail.

## OPERATING CLUTCH AND BRAKE



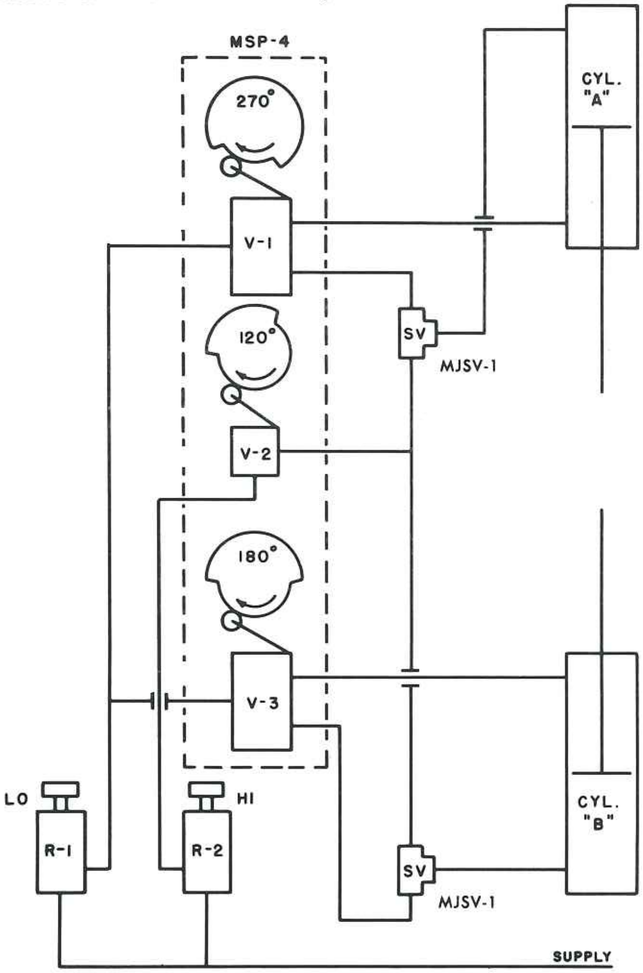
In the above circuit the "off-on" toggle valve pilot operates the 4-way valve V-3 through one side of the shuttle valve, SV. V-3 alternately operates clutch and brake. Push button 3-way valve provides "Jogging" through other side of shuttle valve.

## SELECTION OF PRESET PRESSURES



When toggle valve V-1 is "On", higher pressure from Regulator R-2 overides shuttle valve SV to connect flow to L. With V-1 "off" lower pressure from R-1 is to L.

## CIRCUIT USING SEQUENCE PROGRAMER



Example shows sequence programer (dotted line) controlling two cylinders while crimping a part of an index table. Regulator R-1 is set for low pressure for positioning cylinders; R-2 is set for high pressure for crimping operation. Sequence is as follows:

1) 4-way valve V-1 extends cylinder A against part with low force.

2) 4-way valve V-3 extends cylinder B against part with low force.

3) 3-way valve V-2 overides shuttle valves SV with high pressure increasing force of both cylinders for crimping.

4) V-2 closes, decreasing force of both cylinders while V-3 retracts cylinder B.

5) V-1 retracts cylinder A.

A fourth cam on programer can be used to index the table, operate a counter, or turn itself off after each cycle through use of a Clippard ES-1 electric switch and cam follower.

***For Complete line of Clippard Miniature Cylinders, Valves, Flow Controls, Filters, Programmers, Fittings, and Accessories, see Clippard Catalog***

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LITHO IN U.S.A.

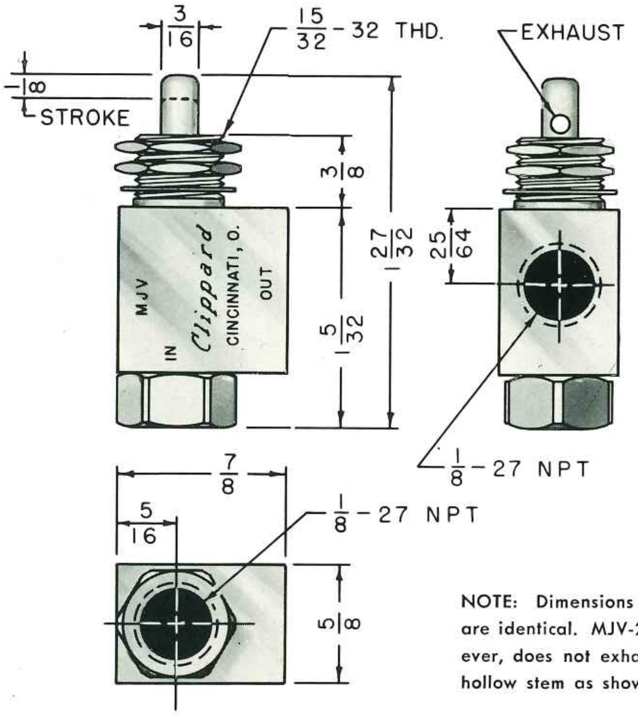
# *Clippard* MINIATURE CONTROL VALVES

**Bulletin No. 363**

## NEW MINIATURE "JUMBO" 2 and 3-WAY VALVES

## Model No. MJV-2 and MJV-3

DRAWING SHOWS UNITS ACTUAL SIZE.



NOTE: Dimensions of MJV-2 and MJV-3 are identical. MJV-2 Two Way Valve, however, does not exhaust to atmosphere thru hollow stem as shown above.

Two new miniature poppet type valves, similar in construction to our MAV-2 and MAV-3 valves, but with flow rates so remarkably large for their size they are ideal for direct control of air drills, grinders and large cylinders. These valves also have the advantage of always being definitely "on" or "off." Unlike most other valves on the market, this type has no intermediate position that allows leakage from input to exhaust.

MODEL NO. MJV-2 is a direct acting, normally closed 2-way poppet valve for use with air, oil or water. MODEL NO. MJV-3 is a direct acting, normally closed 3-way poppet valve for use with air only. Exhaust is to atmosphere thru hollow stem. Ideal for use with spring return cylinders or pilot valves.

Precision machined from brass, bright dipped for appearance and corrosion resistance. Stems and springs are stainless steel to prevent corrosion and give long life. Seals are Buna N. Two nuts and lock washers are provided for panel or bracket mounting. Both input and output ports are tapped ⅛″ pipe.

Valves can be actuated manually with Clippard No. 11916-2 Push Button, or automatically with Clippard AVSC Solenoid, MPA-3 Pilot Actuator, or No. 11925 Cam Follower.

***See opposite side of this sheet for mounting instructions.***

MAXIMUM PRESSURE at which valve can be operated using Clippard AVSC Solenoid is: 300 psi.

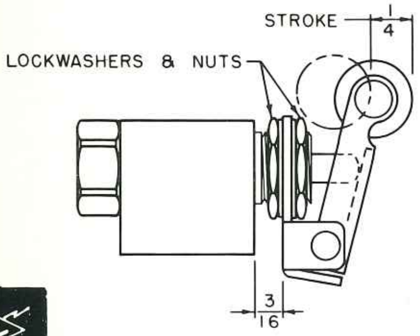
MINIMUM PRESSURE required on Clippard MPA-3 Pilot Actuator is 32 psi for operation of MJV-2 or 3 Valves at 50 psi input.

| DESIGN & PERFORMANCE DATA | MODEL NUMBER | |
|---|---|---|
| | MJV-2 | MJV-3 |
| Type of valve | 2-way poppet | 3-way poppet |
| Medium | Air or Hydraulic | Air Only |
| Stem Travel Required | .125 | .125 |
| Recommended Working Range | 0 to 300 psi | 0 to 300 psi |
| Flow @ 50 psi Air | 14.0 CFM | 14.0 CFM |
| Flow @ 100 psi Air | 25.0 CFM | 25.0 CFM |
| Force required for Full Stem Travel @ 50 psi | 38.0 OZ | 38.0 OZ |
| Temperature Range | —30°F to +230°F | |

# *Clippard* MINIATURE CONTROL VALVES

**Bulletin No. 363**

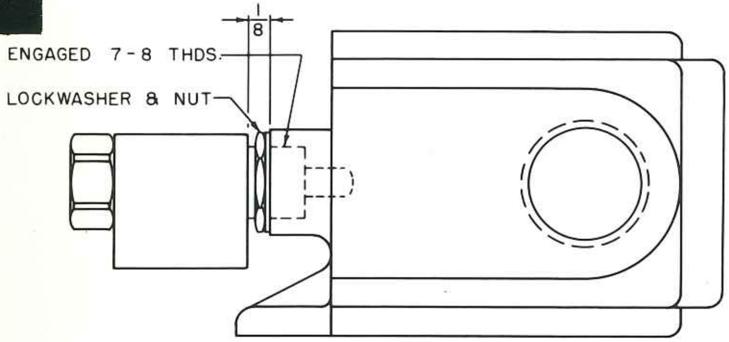
## MOUNTING INSTRUCTIONS
## For MINIATURE "JUMBO" 2 and 3-WAY VALVES
## Model No. MJV-2 and MJV-3



### FOR AUTOMATIC OPERATION WITH CLIPPARD NO. 11925 CAM FOLLOWER HEAD

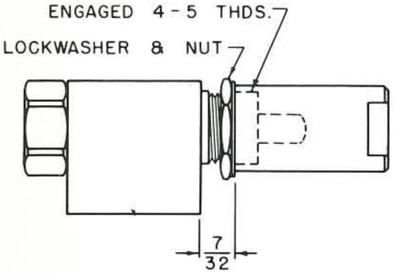
Using two nuts and lock washers provided, mount cam follower on valve stud with space of 3/16″ between cam follower base and valve body. This provides proper clearance for cam follower arm with 1/4″ stroke to depress valve stem 1/8″ to "ON" position.

NOTE: Normal operating range of stem is .125. Do not exceed .140. Do not use stem itself as a stop.



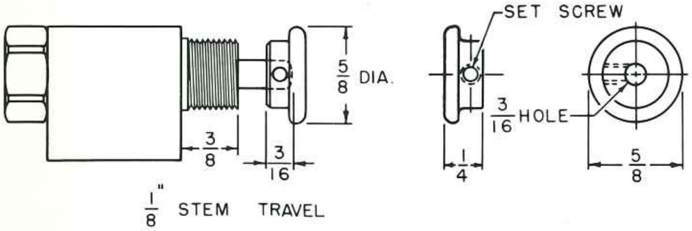
### FOR AUTOMATIC OPERATION WITH CLIPPARD MODEL AVSC A.C. SOLENOID

Using one of the nuts and lockwashers provided with valve, engage 7 to 8 threads on valve stud, leaving 1/8″ clearance between housing and valve body. This provides proper clearance to depress valve stem 1/8″ to "ON" position.



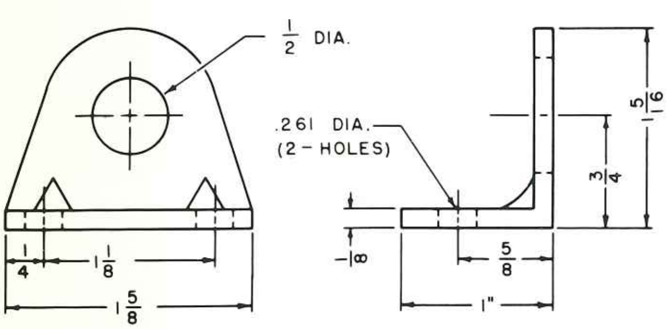
### FOR AUTOMATIC OPERATION WITH CLIPPARD MODEL MPA-3 PILOT ACTUATOR

Using one of the nuts and lockwashers provided, engage 4 to 5 threads on valve stud, leaving 7/32″ clearance between MPA-3 barrel and valve body. This provides proper clearance to depress valve stem 1/8″ to "ON" position.



### FOR MANUAL OPERATION OR MACHINE LIMIT STOP WITH CLIPPARD NO. 11916-2 PUSH BUTTON

Place on valve stem and secure in position by tightening Allen Head locking screw with Allen Head wrench provided. Button provides external stop for limiting stem travel to 1/8″ to avoid valve damage.



### ANGLED MOUNTING BRACKET NO. 15018-2

For sturdiest bracket mounting we recommend Clippard Angled Mounting Bracket No. 15018-2, but valves will also fit No. 11917-1 Flat, or No. 11918-1 Angled Mounting Brackets. Bracket No. 15018-2 is also recommended for mounting Clippard 9/16″ Heavy Duty Cylinders.

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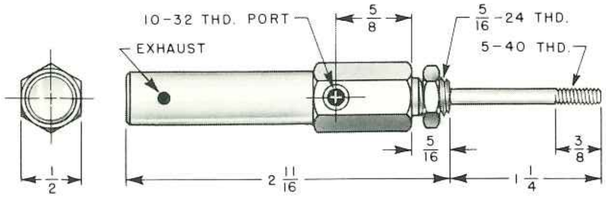
# NEW *Clippard* MINIATURE SINGLE ACTING AIR RETURN CYLINDERS

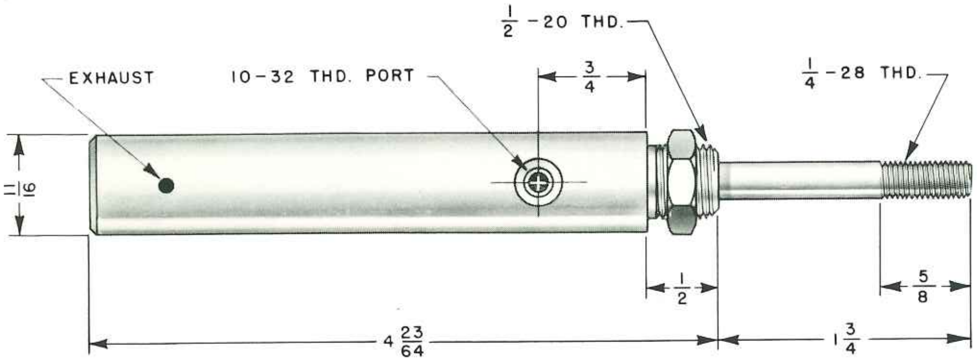
**Bulletin No. 964**

## TYPE 3SS-AR½, 3/8″ BORE, STUD MOUNT, SPRING EXTENDED

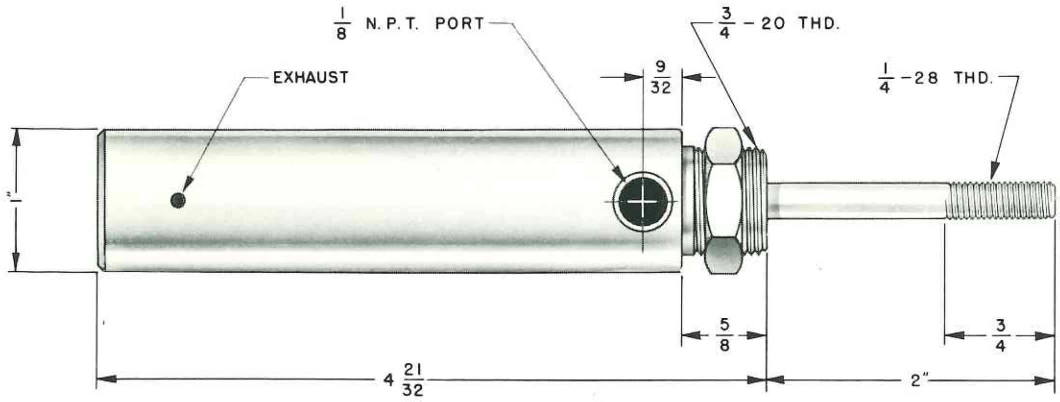


Here are three new Clippard "Spring Out — Air Return" Single Acting Cylinders. They provide positive forward spring force in one direction. In retracted position they are controlled by air pressure. In event of air failure, ram immediately returns to out position. Applications include, Spring Clamping — Air Released Jigs, Fixtures and Hold Downs, Fail Safe Operations, Lock-Out, or Stop Pin devices, and Detent Latching. For other types and sizes of cylinders, see Clippard Catalog, pages 8 thru 12.

## SERIES 9SS-AR-1, 9/16″ BORE, STUD MOUNT, SPRING EXTENDED



## SERIES 7SS-AR-1, 7/8″ BORE, STUD MOUNT, SPRING EXTENDED



### ENGINEERING & DESIGN DATA — CLIPPARD SINGLE ACTING AIR RETURN CYLINDERS

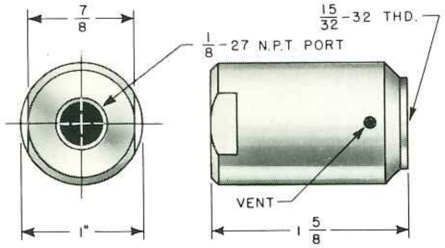
| CYLINDERS | ENGINEERING DATA | | | DESIGN FEATURES | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | MEDIUM | FORCE FACTOR | REC. MAX. WORKING PRESSURE | PISTON SEALS | ROD SEALS | ROD DIA. | ROD END | CONSTRUCTION | |
| 3/8″ BORE AIR RETURN (Spring Extended) | Air | .1 | 125 psi | Vee Block | Vee Block | 1/8″ | Threaded | R. F. Silver Soldered | Minimum of 14 psi required for rod retraction. Fully extended spring force 10 oz. Fully retracted spring force 20 oz. |
| 9/16″ BORE AIR RETURN (Spring Extended) | Air | .22 | 250 psi | Vee Block | Vee Block | 1/4″ | Threaded | Threaded | Minimum of 19 psi required for rod retraction. Fully extended spring force 2 lbs. Fully retracted spring force 4 lbs. |
| 7/8″ BORE AIR RETURN (Spring Extended) | Air | .60 | 250 psi | Vee Block | Vee Block | 1/4″ | Threaded | Threaded | Minimum of 23 psi required for rod retraction. Fully extended spring force 7 lbs. Fully retracted spring force 12 lbs. |

TEMPERATURE RANGE: — 30°F to + 230°F

# NEW *Clippard* MINIATURE VALVE ACTUATORS, ACCESSORIES and FITTINGS

**Bulletin No. 964**

## 7/8" BORE MINIATURE PILOT ACTUATOR — Model No. MPA-7



For general description and applications, see Pilot Actuator Model MPA-3 on page 4 of Clippard Catalog. Our Model MPA-7, 7/8" Bore Pilot Actuator is, however, 6 times more sensitive than Model MPA-3. Where MPA-3 has a force factor of 0.1, the MPA-7 has a force factor of 0.6, enabling lower control pressure to be used in actuation of various valves and switches shown in accompanying chart.

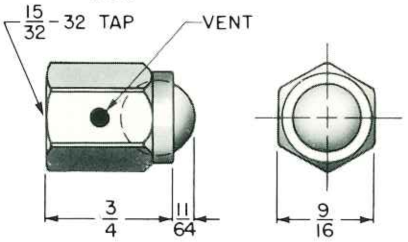
MIN. OPERATING PRESSURES FOR PILOT ACTUATOR COMBINATIONS

| MPA-7 WITH: | MIN. REQ. |
|---|---|
| ES-1 Switch | 2 psi |
| MAV-2 & MAV-3 Valves | 4 psi* |
| MJV-2 & MJV-3 Valves | 5 psi* |
| MAV-4 Valve | 5½ psi* |
| MAV-4D Valve | 3 psi* |

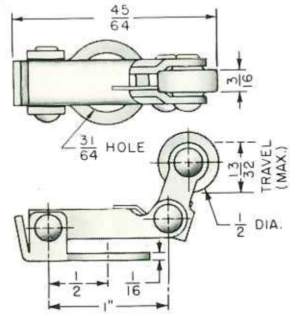
*Minimum pressure required on Clippard MPA-7 Pilot Actuator for operation of valve at 50 psi input.

## MINIATURE BALL ACTUATOR — Model No. MBA-1

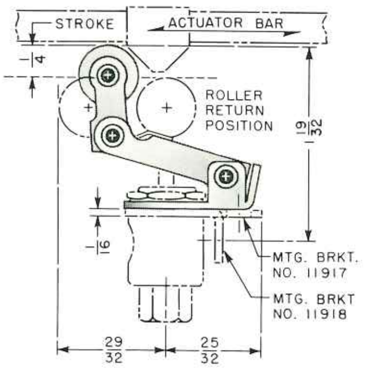
This unit permits the valves and electrical switch (see chart at upper right of this page) to be operated by mechanical movement depressing the ball from any direction.



## MINIATURE ONE-WAY CAM FOLLOWER HEAD — Part No. 12296

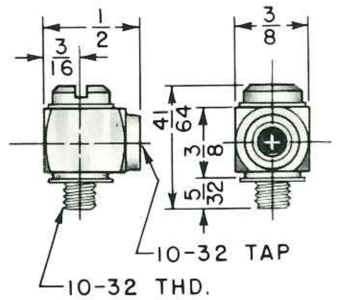


This cam follower is used on the valves and electrical switch (see chart at upper right of this page) when activating cam or linear travel device depresses the follower head in one direction only. There is no actuation on return travel of this type of mechanism.



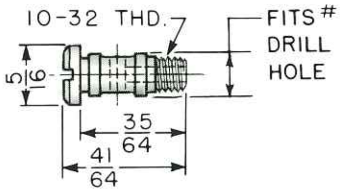
## MINIATURE ADJUSTABLE "L" FITTING
## Part No. 15002-1

Adjustable "L" fitting permits fitting to be aimed in any direction, 360° in one plane, then secured by tightening screw. Useful, also, as a means of connecting or disconnecting hose or tubing in hard-to-get-at spots.



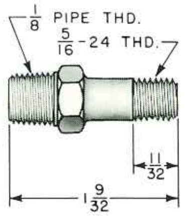
## MINIATURE MANIFOLD STUD
## Part No. 12292

Used for connecting specially made manifolds to multiple ports of valves or cylinders, eliminating the necessity of external fittings and hose.



## MINIATURE QUICK CONNECT, 1/8-27 MALE END — Model No. MQC-VP

This quick connect is similar to our MQC-V2 and MQC-V3, except that its base screws into standard 1/8" NPT plumbing. Shut off valve is internal. Hose connector MQC-F (see Clippard Catalog page 6) is required for connecting to external hose.



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CLIPPARD INSTRUMENT LABORATORY, INC.
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CINCINNATI 39, OHIO
*Phone 521-4261 ... Area Code : 513*

BULLETIN P-11
Oct.1964

**PRICE LIST subject to change without notice**

***Prices are F.O.B. Cincinnati, Ohio, U.S.A.***

### 6.35 MM (1/4") BORE CYLINDERS

| | |
|---|---|
| SM-6 | $3.85 |

### 3/8" BORE CYLINDERS

| MODEL | PRICE |
|---|---|
| 3PS-1/2 | $3.50 |
| 3SS-1/2 | 4.00 |
| 3SS-1 | 5.00 |
| 3SS-2 | 5.50 |
| 3SS-3 | 6.00 |
| 3CS-1/2 | 5.40 |
| 3CS-1 | 5.90 |
| 3CS-2 | 6.40 |
| 3CS-3 | 6.90 |
| 3BDS-1 | 8.25 |
| 3BDS-2 | 8.75 |
| 3BDS-3 | 9.25 |
| 3BDS-4 | 9.75 |
| 3BDS-5 | 10.25 |
| 3BDS-6 | 10.75 |
| 3BDD-1 | 8.90 |
| 3BDD-2 | 9.40 |
| 3BDD-3 | 9.90 |
| 3BDD-4 | 10.40 |
| 3SD-1 | 6.80 |
| 3SD-2 | 7.30 |
| 3SD-3 | 7.80 |
| 3SD-4 | 8.30 |
| 3CD-1 | 6.80 |
| 3CD-2 | 7.30 |
| 3CD-3 | 7.80 |
| 3CD-4 | 8.30 |

### SINGLE ACTING, SPRING OUT, AIR RETURN CYLINDERS

| MODEL | PRICE |
|---|---|
| 3SS-AR-1/2 | $5.20 |
| 9SS-AR-1 | 9.60 |
| 7SS-AR-1 | 12.25 |

### SEQUENCE PROGRAMERS

| MODEL | PRICE |
|---|---|
| MSP-4 | $43.80 |
| MSP-6 | 48.90 |
| MSP-8 (MSP-1) | 54.00 |
| MSP-10 | 59.10 |
| MSP-12 | 64.20 |
| MSP-14 | 69.30 |

Includes Standard or Blank Cams

C-33 Cams (each) 2.55

Special Cut Cams:
Add $1.00 each extra

Hollow Shaft for 3SS
or 9SS Cylinders:
Add $1.75 each extra

### 9/16" BORE CYLINDER

| MODEL | PRICE |
|---|---|
| 9PS-3/4 | $6.00 |
| 9BS-3/4 | 7.70 |
| 9BS-1 1/2 | 8.20 |
| 9BS-2 1/4 | 8.70 |
| 9BS-3 | 9.20 |
| 9SS-3/4 | 6.25 |
| 9SS-1 1/2 | 6.75 |
| 9SS-2 1/4 | 7.25 |
| 9SS-3 | 7.75 |
| 9CS-3/4 | 6.40 |
| 9CS-1 1/2 | 6.90 |
| 9CS-2 1/4 | 7.40 |
| 9CS-3 | 7.90 |
| 9BDS-1 | 10.30 |
| 9BDS-2 | 10.80 |
| 9BDS-3 | 11.30 |
| 9BDS-4 | 11.80 |
| 9BDS-5 | 12.30 |
| 9BDS-6 | 12.80 |
| 9BDD-1 | 11.85 |
| 9BDD-2 | 12.35 |
| 9BDD-3 | 12.85 |
| 9Bdd-4 | 13.35 |
| 9BDD-5 | 13.85 |
| 9BDD-6 | 14.35 |
| 9SD-1 | 7.40 |
| 9SD-2 | 7.90 |
| 9SD-3 | 8.40 |
| 9SD-4 | 8.90 |
| 9SD-5 | 9.40 |
| 9SD-6 | 9.90 |
| 9CD-1 | 8.10 |
| 9CD-2 | 8.60 |
| 9CD-3 | 9.10 |
| 9CD-4 | 9.60 |
| 9CD-5 | 10.10 |
| 9CD-6 | 10.60 |

### AIR VALVES

| MODEL | | PRICE |
|---|---|---|
| MAV-2 | 2-way | $3.75 |
| MAV-2P | 2-way | 3.75 |
| MAV-3 | 3-way | 3.85 |
| MAV-3P | 3-way | 3.85 |
| MAV-4 | 4-way | 7.25 |
| MAV-4D | 4-way | 9.00 |
| MJV-2 | 2-way | 6.10 |
| MJV-3 | 3-way | 6.25 |
| MTV-3 | Toggle | 6.40 |
| MTV-3P | Toggle | 6.40 |
| MNV-1 | Needle | 2.50 |
| MCV-1 | Check | 2.45 |
| MJCV-1 | Check | 2.95 |
| MFC-1 | Flow | 4.00 |
| MFC-2 | Flow | 4.45 |
| MJSV-1 | Shuttle | 4.25 |
| MSV-1 | Shuttle | 3.85 |
| MEV-1 | Exhaust | 3.15 |
| MAF-1 | Filter | 7.20 |
| MAR-1 | Regulator | 6.85 |
| MAR-1P | Regulator | 6.85 |
| MQC-2 | Coupling | 1.75 |
| MQC-3 | Coupling | 1.75 |
| MQC-V2 | - | 1.00 |
| MQC-V3 | - | 1.00 |
| MQ CV-P | - | 1.00 |
| MQC-F | - | .85 |

### HIGH PRESSURE 9/16" BORE CYLINDERS

| MODEL | PRICE |
|---|---|
| 9S-1S | $9.40 |
| 9S-2S | 10.40 |
| 9S-3S | 11.40 |
| 9S-1D | 11.20 |
| 9S-2D | 11.70 |
| 9S-3D | 12.20 |
| 9S-4D | 12.70 |
| 9S-5D | 13.20 |
| 9S-6D | 13.70 |
| 9C-1S | 9.80 |
| 9C-2S | 10.80 |
| 9C-3S | 11.80 |
| 9C-1D | 11.60 |
| 9C-2D | 12.10 |
| 9C-3D | 12.60 |
| 9C-4D | 13.10 |
| 9C-5D | 13.60 |
| 9C-6D | 14.10 |
| 9U-1S | 10.20 |
| 9U-2S | 11.20 |
| 9U-3S | 12.20 |
| 9U-1D | 12.00 |
| 9U-2D | 12.50 |
| 9U-3D | 13.00 |
| 9U-4D | 13.50 |
| 9U-5D | 14.00 |
| 9U-6D | 14.50 |

### 7/8" BORE CYLINDERS

| MODEL | PRICE |
|---|---|
| 7S-1 | $17.85 |
| 7D-1 | 15.85 |
| 7D-2 | 16.35 |
| 7D-3 | 16.85 |
| 7D-5 | 17.85 |
| 7D-7 | 18.85 |
| 7D-9 | 19.85 |
| 7SS-1 | 16.75 |
| 7SD-1 | 14.75 |
| 7SD-2 | 15.25 |
| 7SD-3 | 15.75 |
| 7SD-5 | 16.75 |
| 7SD-7 | 17.75 |
| 7SD-9 | 18.75 |

### AIR VALVE SOLENOIDS

| MODEL | PRICE |
|---|---|
| AVS-12 | $12.00 |
| AVS-24 | 12.00 |
| AVS-48 | 12.00 |
| AVSC-12 | 13.75 |
| AVSC-24 | 13.75 |
| AVSC-115 | 12.75 |
| AVSC-230 | 13.75 |

For threading of standard non-threaded rods, add $1.00 each extra.

3/16" rods threaded 10-32 x 1/2"
1/8" rods threaded 5-40 x 1/2"

***FOR FITTINGS, HOSE & ACCESSORIES SEE REVERSE SIDE***

## FITTINGS & ACCESSORIES

| PART NO. | DESCRIPTION | UNIT PRICE | PACKAGED |
|---|---|---|---|
| ES-1 | Electric Switch | $3.85 | -- |
| MPA-3 | Pilot Actuator 3/8" | 3.25 | -- |
| MPA-7 | Pilot Actuator 7/8" | 4.60 | -- |
| MAN-12 | 12-Port Manifold | 2.90 | -- |
| MRM-6 | Rotary 6-port Manifold | 4.30 | -- |
| MBA | Ball Actuator | 1.65 | -- |
| STO-1 | Solder Tube Outlet for 1/4" Tubing | -- | 5 for $1.45 |
| STO-2 | Solder Tube Outlet for 5/16" Tubing | -- | " " 1.45 |
| 0022-112 | *10-32 Cyl. Mtg. Screw | -- | " " .45 |
| 0302-32 | Lockwashers | -- | " " .15 |
| 3810-1 | 1/8" Pipe to 1/8" Tube Connector | -- | " " 1.15 |
| 3810-2 | 1/16" Pipe to 1/8" Tube Connector | -- | " " 1.55 |
| 5000-1 | Hose Clamp -- Crimp-on Type | -- | " " .75 |
| 5000-2 | Hose Clamp -- Thread-on Type | -- | " " .40 |
| 11752-1 | *10-32 to 1/8" I. D. Hose Fitting | -- | " " 1.30 |
| 11752-2 | *10-32 to 1/16" I. D. Hose Fitting | -- | " " 1.30 |
| 11755 | *Screw Plug | -- | " " .45 |
| 11761 | Gasket Buna-N | -- | 25" .25 |
| 11761 | Gasket Lead | -- | 25" .25 |
| 11767 | Rod Insulator Tapped for 8-32 | -- | 5 " .40 |
| 11783 | Cylinder Angled Bracket | .30 | -- |
| 11916-1 | Push Button | .50 | -- |
| 11916-2 | Push Button | .50 | -- |
| 11917-1 | Flat Mtg. Bracket -- Valve | .20 | -- |
| 11917-2 | Flat Mtg. Bracket -- Cyl. | .20 | -- |
| 11918-1 | Angled Mtg. Bracket -- Valve | .25 | -- |
| 11918-2 | Angled Mrg. Bracket -- Cyl. | .25 | -- |
| 11923 | *10-32 to 1/8" Tube Connector | -- | 5 for 1.30 |
| 11924 | 1/8" Pipe to 1/8" Hose Fitting | -- | " " .90 |
| 11925 | Cam Follower | .95 | -- |
| 11995 | Cylinder Flat Bracket | .20 | -- |
| 11996 | 10-32 Male Clevis | .50 | -- |
| 11997 | 8-32 Female Clevis | .50 | -- |
| 11999 | *Short Coupling | -- | 5 for 1.00 |
| 12020 | End Seal Repair Kit - 3/8" Series | .70 | -- |
| 12098 | Spacer for MPA-3 | -- | 5 for .40 |
| 12145 | Filter Element | 3.00 | -- |
| 12292 | * Screw Only & Washer | .45 | 5 for 1.90 |
| 12296 | One Way Cam Follower | 1.85 | -- |
| 15002-1 | Universal L Fitting | .75 | 5 for 3.20 |
| 15002-2 | *"L" Fitting | .45 | 5 for 1.85 |
| 15002-3 | *"T" Fitting | .45 | 5 for 1.85 |
| 15002-4 | *"X" Fitting | .50 | 5 for 1.95 |
| 15002-5 | "X" Coupling | .50 | 5 for 1.95 |
| 15004 | Hex Connector | -- | 5 for .80 |
| 15006-1 | 1/8" Pipe to 10-32 | -- | 5 for .80 |
| 15006-2 | 1/16" Pipe to 10-32 | -- | 5 for .80 |
| 15009 | 10-32 Female Clevis | .50 | -- |
| 15014 | Pilot Coupling Assembly | 1.60 | -- |
| 15015 | Rod Clevis Assembly | 1.50 | -- |
| 15018-1 | Cylinder Angled Bracket | .75 | -- |
| 15018-2 | Cylinder and Valve Angled Bracket | .75 | -- |
| 15019 | Cylinder Clevis Mtg. Assembly | 1.50 | -- |
| 15022 | Ferrule for Tubing Connectors | -- | 5 for .25 |
| 17520 | End Seal Repair Kit - 9/16" Series | .75 | -- |
| 17521 | End Seal Repair Kit - 7/8" Series | .75 | -- |
| --- | 15/32 - 32 Taps (ground for steel) | 7.00 | -- |

* = Buna-N gaskets are included with all 10-32 Fittings

## TUBING & HOSE

| PART NO. | DESCRIPTION | I.D. | Price/Ft. | Price 50/Ft. Roll |
|---|---|---|---|---|
| 11763 | Braided Buna-N Hose | 1/8" | .25 | $10.00 |
| 11765 | Buna-N Hose | 1/8" | .15 | 6.00 |
| 3811-1 | Copper Tubing | 1/16" | .25 | 10.00 |
| 3814-1 | Vinyl Hose | 1/8" | .15 | 6.00 |
| 3814-2 | Nylon Tubing | 3/32" | .10 | 4.00 |
| 3814-3 | Twin Vinyl Hose | 1/8" | .30 | 12.00 |
| 3814-4 | Vinyl Hose (Black or Clear) | 1/16" | .10 | 4.00 |

Litho. in U.S.A.